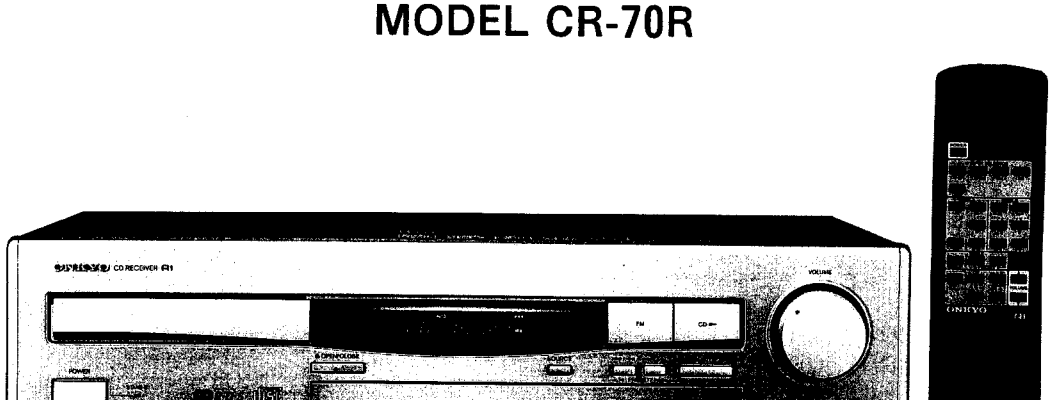
REF. NO. 3521

# ONKYO® SERVICE MANUAL

## COMPACT DISC RECEIVER
## MODEL CR-70R



**Black and Silver models**

| | |
|---|---|
| UP | 230V AC, 50Hz |
| UW | 120/220V AC, 60/50Hz |

**SAFETY-RELATED COMPONENT WARNING!!**

COMPONENTS IDENTIFIED BY MARK ⚠ ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PARTS NUMBERS APPEAR AS SHOWN IN THIS MANUAL.

MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

## TABLE OF CONTENTS


Specifications ..... 2
Caution on replacement of optical pickup ..... 2
Protection of eyes from laser beam ..... 3
Laser warning labels ..... 3
Microprocessor connection diagram ..... 4
Microprocessor terminal descriptions ..... 5
IC block diagrams and descriptions ..... 6
Removement of tray ass'y ..... 12
Block diagrams ..... 13
CD mechanism-exploded view ..... 16
Parts list ..... 18
Exploded view ..... 19
Adjustment procedures ..... 21
Service procedures ..... 24
Pc board views from bottom side ..... 25
Schematic diagram ..... 27
Printed circuit board-parts list ..... 35
CD mechanism-schematic diagram ..... 39
Packing view ..... 40


ONKYO
AUDIO COMPONENTS

# SPECIFICATIONS

## AMP SECTION

| | | |
|---|---|---|
| Power Output: | 2 × 50 watts at 4 ohms 1 kHz DIN<br>2 × 37 watts at 8 ohms 1 kHz DIN | |
| Continous Power output: | 30 watts per channel min. RMS. at 8 ohms both channels driven from 20 Hz to 20kHz with no more than 0.08% THD. | |
| Dynamic Power: | 2 × 84 watts at 2 ohms<br>2 × 73 watts at 3 ohms<br>2 × 67 watts at 4 ohms<br>2 × 43 watts at 8 ohms | |
| Total Harmonic Distortion: | 0.08 % at Rated Power | |
| IM Distortion: | 0.08 % at Rated Power | |
| Damping Factor: | 50 at 8 ohms | |
| Sensitivity and Impedance: | TAPE-1, 2 LINE PLAY: | 150mV , 50kohms |
| | TAPE-1. 2 REC: | 150mV , 2.2kohms |
| Frequency Response: | 20 to 30,000 Hz : ±1 dB | |
| Tone Control: | BASS : ± 10 dB at 100 Hz<br>TREBLE : ± 10 dB at 10,000 Hz<br>LOUDNESS:+7dB at 70Hz<br>+5dB at 10kHz | |
| Single to Noise Ratio: | LINE/TAPE:100 dB (IHF A) | |
| Muting: | – ∞ dB | |

## CD SECTION

| | |
|---|---|
| Signal readout system: | Optical non–contact |
| Reading rotation: | About 500 – 200 r.p.m. (constant linear velocity) |
| Linear velocity: | 1.2 – 1.4 m / s |
| Error correction system: | Cross Interleave Read Solomon code |
| D / A converter: | 1 bit |
| Digital filter: | 352.8 kHz 8 times over sampling |
| Number of channels: | 2 (stereo) |
| Frequency response: | 5 Hz – 20 kHz |

## FM Tuner section

| | |
|---|---|
| Tuning Range: | 87.50 to 108,00 MHz (50 kHz steps) |
| Usable Sensitivity: | Mono 12.4 dBf, 1.2 µV (75 ohms IHF)<br>1.2 µV (75 ohms DIN)<br>Stereo 19.2 dBf,2.5µV (75 ohms IHF)<br>25.0µV (75ohms DIN) |
| 50 dB Quieting: | Mono 18.2 dBf,<br>2.2µV (75 ohms) |
| Sensivity: | Stereo 38.2 dBf,<br>22.0 µV (75 ohms) |
| Capture Ratio: | 1.5 dB |
| Image Rejection Ratio: | 85 dB |
| IF Rejection Ratio: | 90 dB |
| Signal-to-Noise Ratio: | Mono 73 dB, IHF<br>Stereo 67 dB, IHF |
| Selectivity: | 50 dB DIN (+ / – 300 kHz at 40 kHz Devi.) |
| AM Suppression Ratio: | 50dB |
| Harmonic Distortion: | Mono 0.25 %<br>Stereo 0.50 % |
| Frequency Response: | 30 to 15,000 Hz (+ / – 1.5 dB) |
| Stereo Separation: | 40 dB at 1.000 Hz<br>30 dB at 100 to 10,000 Hz |
| Stereo Threshold: | 17.2 dBf, 2.0 µV (75 ohms) |

## General

| | |
|---|---|
| Power supply: | European model : AC 230V , 50Hz<br>Worldwide model: AC 120V/220V switchable , 50/60Hz |
| Dimensions (W×H×D) : | 455 × 110 × 330 mm<br>(17-15/16" × 4-5/10" × 13") |
| Weight: | 7.8 kg (17.2 lbs) |

Specifications and features are subject to change without notice.

# CAUTION ON REPLACEMENT OF OPTICAL PICKUP

**The laser diode in the optical pickup block is so sensitive to static electricity,surge current and etc, that the components are liable to be broken down or its reliability remarkably deteriorated.**

**During repair,carefulley take the following precautions. (The following precautions are included in the service parts.)**

## PRECAUTIONS

1.Ground for the work-desk.
Place a conductive sheet such as a sheet of copper (with inpedance lower than 10MΩ) on the work-desk and place the set on the conductive sheet so that the chassis.

2.Grounding for the test equipment and tools.
Test equipments and toolings should be grounded in order that their ground level is the same the ground of the power source.

3.Grounding for the human body.
Be sure to put on a wrist-strap for grounding whose other end is grounded.
Be particularly careful when the workers wear synthetic fiber clothes, or air is dry.

4.Select a soldering iron that permits no leakage and have the tip of the iron well-grounded.

5.Do not check the laser diode terminals with the probe of a circuit tester or oscilloscope.

# PROTECTION OF EYES FROM LASER BEAM DURING SERVICING

This set employs a laser. Therefore, be sure to follow carefully the instructions below when servicing.

WARNING!!

WHEN SERVICING, DO NOT APPROACH THE LASER EXIT WITH THE EYE TOO CLOSELY. IN CASE IT IS NECESSARY TO CONFIRM LASER BEAM EMMISION, BE SURE TO OBSERVE FROM A DISTANCE OF MORE THAN 30cm FROM THE SURFACE OF THE OBJECTIVE LENS ON THE OPTICAL PICK-UP BLOCK.

**Laser Diode Properties**

- Material: GaAlAs
- Wavelength: 760～800 nm
- Emission Duration: continuous
- Laser output: max. 0.5mW*

*This output is the value measured at a distance about 1.8mm from the objective lens surface on the Optical Pick-up Block.

# LASER WARNING LABELS

The label shown below are affixed.

1. **Warning lable**
   This label is located on the chassis.

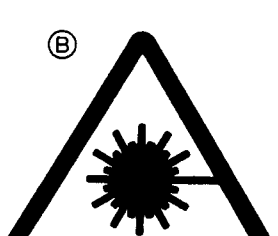
Ⓐ

**DANGER** —INVISIBLE LASER RADIATION WHEN OPEN AND INTERLOCK FAILED OR DEFEATED. AVOID DIRECT EXPOSURE TO BEAM.

**CAUTION** —HAZARDOUS LASER AND ELECTROMAGNETIC RADIATION WHEN OPEN AND INTERLOCK DEFEATED.

**ATTENTION** —RAYONNEMENT LASER ET ELECTROMAGNETIQUE DANGEREUX SI OUVERT AVEC L ECLENCHEMENT DE SECURITE ANNULE.

Ⓑ

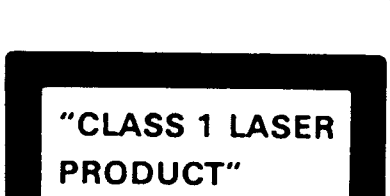


Ⓒ

VARNING
OSYNLIG LASERSTRÅLNING NÄR DENNA DEL ÄR ÖPPNAD OCH SPÄRREN ÄR URKOPPLAD. BETRAKTA EJ STRÅLEN.
VARO!
AVATTAESSA JA SUOJALUKITUS OHITETTAESSA OLET ALTTIINA NÄKYMÄTTÖMÄLLE LASERSÄTEILYLLE. ÄLÄ KATSO SÄTEESEEN.
ADVARSEL: USYNLIG LASERSTRÅLING VED ÅBNING, NÅR SIKKERHEDSAF-BRYDER ER UDE AF FUNKTION. UNDGÅ UDSÆTTELSE FOR STRÅLING.
ADVARSEL
USYNLIG LASERSTRÅLING NÅR DEKSEL ÅPNES OG SIKKERHEDSLÅS BRYTES. UNNGÅ EKSPONERING FOR STRÅLEN.

Ⓐ : Danger label
Ⓒ : Only 230V model

2. **Class 1 label**
   This label is located on the rear panel.




LUOKAN 1 LASERLAITE

KLASS 1 LASER APPARAT

ADVARSEL

Denna maekning er anbragt på apparatets højre side og indikerer, at apparatet arbejder med laserstråler af klasse 1, hvilket betyder, at der anvendes laserstråler af svageste klasse, og at man ikke på apparatets yderside kan blive udsat for utilladelig kraftig stråling.

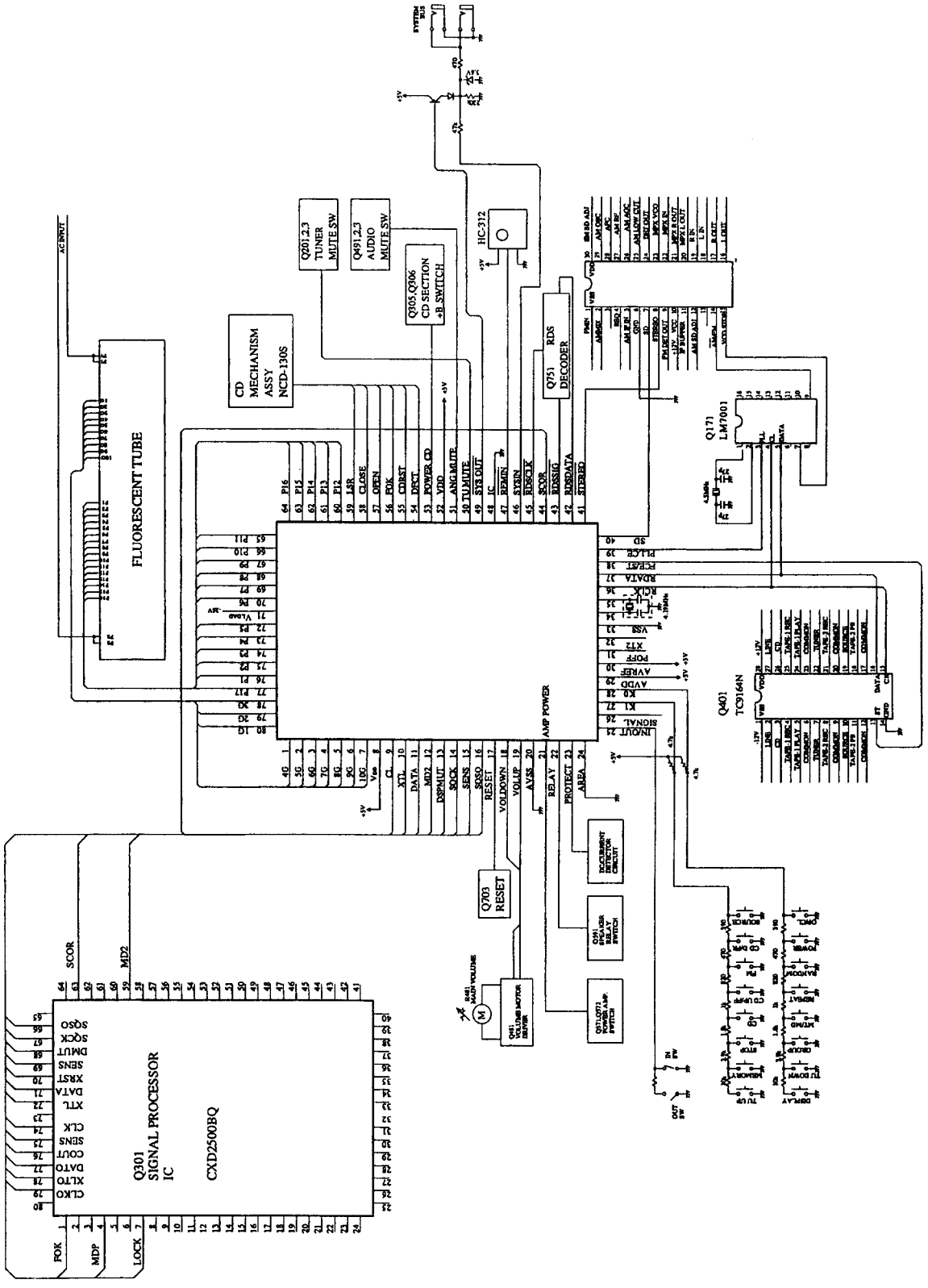
APPARATET BØ/R KUN ÅBNES AF FAGFOLK MED SÆRLIGT KENDSKAB TIL APPARATER MED LASERSTRÅLERI

Indvendigt i apparatet er anbragt den her gengivne advarselsmærkning, som advarer imod at foretage sådnne indgreb i apparatet, at man kan komme til at udsaette sig for laserstråling.

VAROITUS! LAITTEEN KAYTTAMINEN MUULLA KUIN TASSA KAYTTOOHJEESSA MAINTULLA TAVALLA SAATTAA ALTISTAA KAYTTAJAN TURVALLISUUSLUOKAN 1 YLITTAVALLE NAKYMATTOMALLE LASERSATEILYLLE.

# MICROPROCESSOR CONNECTION DIAGRAM

## μPD78044AGF-123



# TERMINAL DESCRIPTIONS

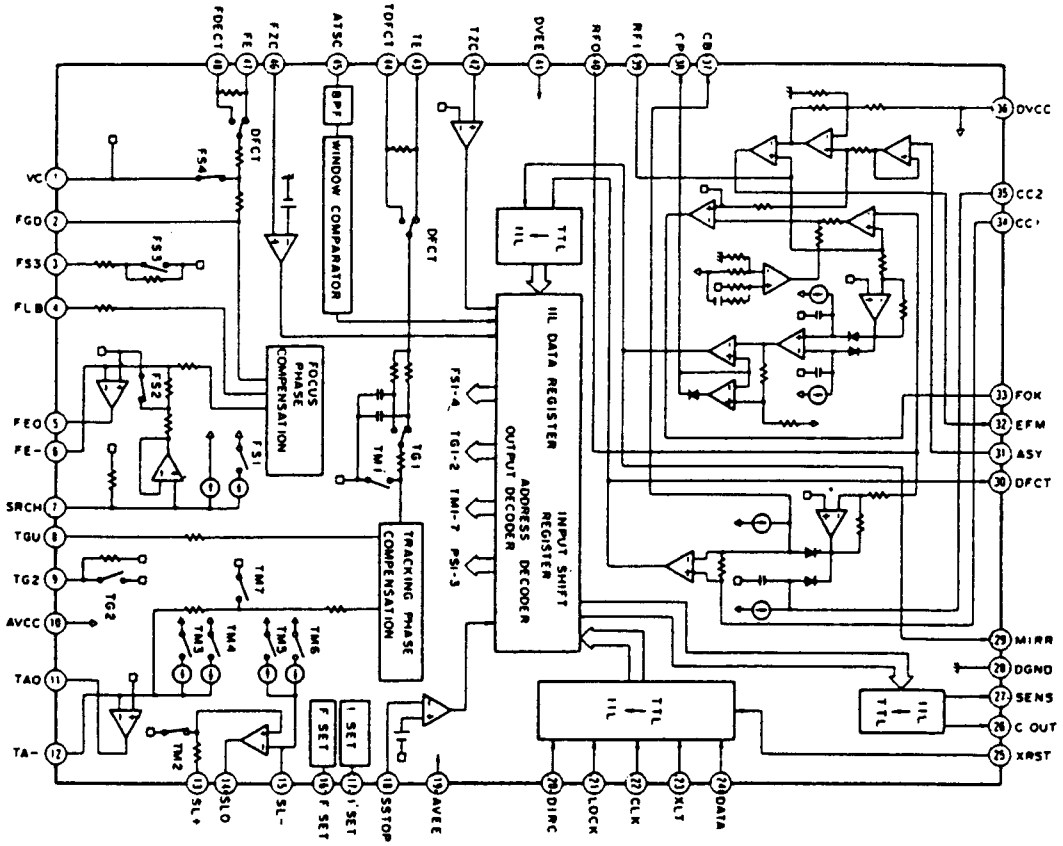
| Pin No. | Function | Description |
|---|---|---|
| 1~7 | 4G~10G | Grid output terminals. |
| 8 | VDD | Power supply terminal. |
| 9 | CDCLK | Clock output terminal. Connect the terminal CLOCK of signal processor IC. |
| 10 | XTL | Latch output terminal. Connect the terminal XLAT of signal processor IC. |
| 11 | CDDATA | Data output terminal. Connect the terminal DATA of signal processor IC. |
| 12 | MD2 | Digital output control output terminal. Not used. |
| 13 | DSPMUT | Digital muting output terminal. Connect the terminal MUTE of signal processor IC. |
| 14 | SQCK | Clock output terminal for SQCK. Connect the terminal SQCK of signal processor IC. |
| 15 | SENS | Sense signal input terminal. Connect the terminal SENS of signal processor IC. |
| 16 | SQSO | Data input terminal from SQSO. Connect the terminal SQSO of signal processor IC. |
| 17 | $\overline{\text{RESET}}$ | System reset input terminal. |
| 18 | VOL DOWN | Volume control output terminals. |
| 19 | VOL UP | Refer the table 1. |
| 20 | AVSS | Ground terminal for D/A converter. |
| 21 | AMP POWER | Power amplifier switching signal output terminal. |
| 22 | RELAY | Speaker relay control output terminal. |
| 23 | PROTECT | Detection input terminal for protection circuit. |
| 24 | AREA | Initializing setting terminal for the Frequency range. |
| 25 | IN/OUT | Input terminal for tray open/close detection switches. |
| 26 | SIGNAL | Signal level input terminal for automatic memory. |
| 27 | K1 | Operation key connection terminals. |
| 28 | K0 | |
| 29 | AVDD | Analog power supply for D/A converter. |
| 30 | AVREF | Reference power supply for D/A converter. |
| 31 | $\overline{\text{POFF}}$ | Power stoppage detection terminal. |
| 32 | XT2 | Crystal resonator connection terminal for sub system. |
| 33 | VSS | Ground terminal. |
| 34 | X1 | Crystal resonator connection terminal for main system. |
| 35 | X2 | Connect the 4.19MHz crystal resonator. |
| 36 | RCLK | Clock output terminal for PLL IC and the source selector IC. |
| 37 | RDATA | Data output terminal for PLL IC and the source selector IC. |
| 38 | FCE/ST | Strobe output terminal for the source selector IC and electric volume. |
| 39 | PLLCE | Chip enable terminal for PLL IC. |
| 40 | $\overline{\text{SD}}$ | Broadcast detection input terminal. L when received the broadcast more than muting level. |
| 41 | $\overline{\text{STEREO}}$ | Stereo broadcast detection input terminal. L when STEREO. |
| 42 | RDSDATA | Data input terminal from RDS decoder. |
| 43 | $\overline{\text{RDSSIG}}$ | RDS broadcast detection terminal. |
| 44 | SCOR | Sub code detection terminal. Connect the terminal SCOR of signal processor IC. |
| 45 | $\overline{\text{RDSSCK}}$ | Clock input terminal from RDS decoder. |
| 46 | SYSIN | System code input terminal. |
| 47 | $\overline{\text{REMIN}}$ | Remote control signal input terminal. |
| 48 | IC | Connect the ground terminal. |
| 49 | $\overline{\text{SYSOUT}}$ | System code output terminal. |
| 50 | TU MUTE | Muting output terminal for tuner section. |
| 51 | ANGMUT | Analog muting output terminal. |
| 52 | VDD | Positive power supply terminal. |
| 53 | CD POWER | Power supply terminal for CD mechanism. |
| 54 | DEFECT | Defect output pin for CD mechanism. |
| 55 | CD RESET | Reset output terminal for CD mechanism. |
| 56 | FOK | FOK input terminal from CD mechanism. |
| 57 | OPEN | CD tray open control output terminal. |
| 58 | CLOSE | CD tray close control output terminal. |
| 59 | LSR | Optical pickup control output terminal. |
| 71 | VLOAD | Pull-down resistor connection terminal for FL tube controller. |
| 60~70 | P12~P6 | Segment output terminals. |
| 72~77 | P5~P1,P17 | Segment output terminals. |
| 78~80 | 1G~3G | Grid output terminals. |

| Operation | VOLUP output | VOLDOWN output |
|---|---|---|
| Stop | H | H |
| VOL UP | H | L |
| VOL DOWN | L | H |

Table 1

# IC BLOCK DIAGRAM AND DESCRIPTIONS

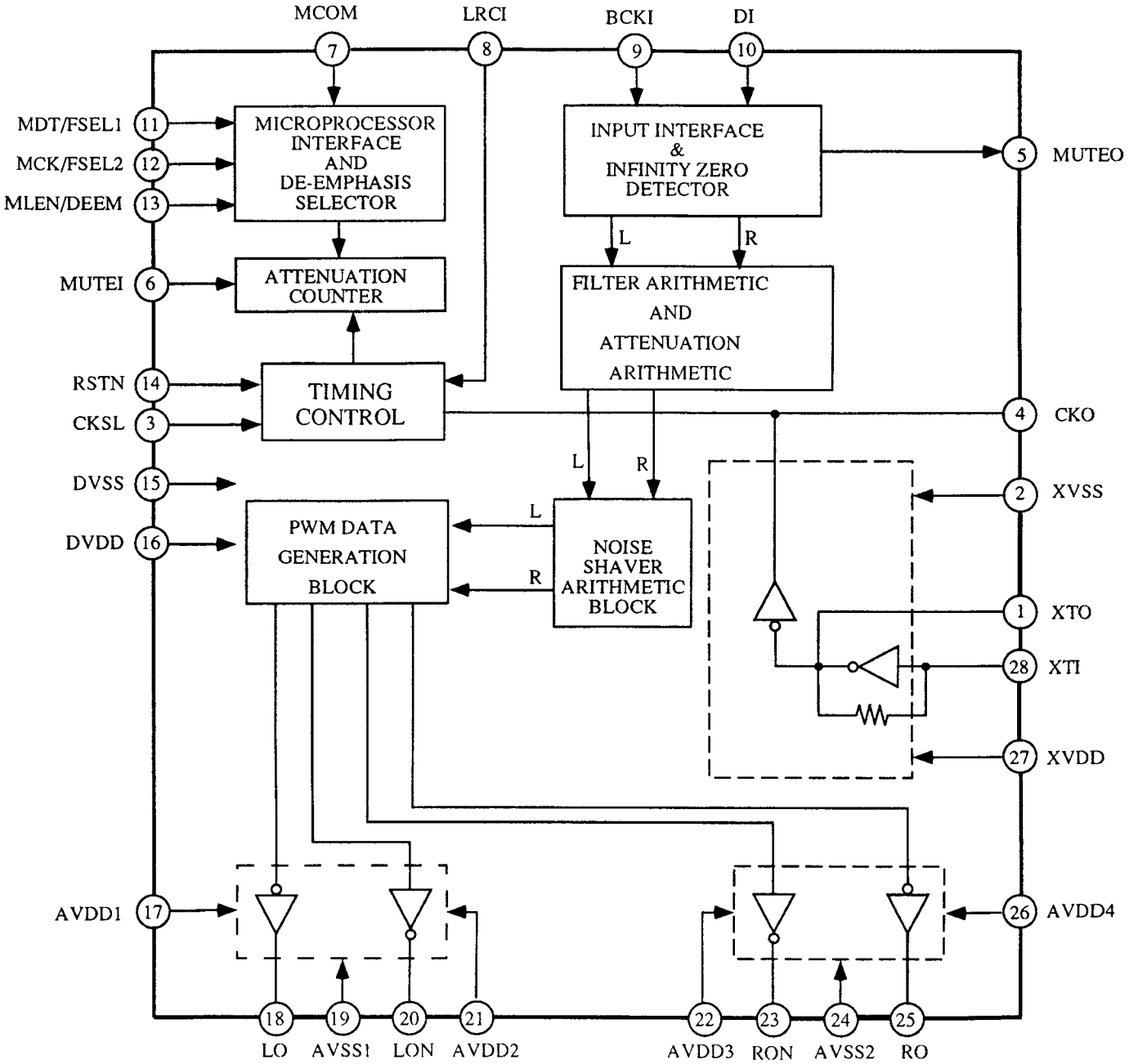
## CXA1372Q (Servo Signal Processor)




| PIN NO. | SYMBOL | I/O | DESCIRPION |
|---|---|---|---|
| 1 | VC | I | Mid-point voltage input terminal. |
| 2 | FGD | I | Connect the capacitor between FS3 and this pin when the high frequency gain focus servo is dropped. |
| 3 | FS3 | I | Focus servo high frequency gain changeover input terminal. |
| 4 | FLB | I | Input terminal for the low frequency boost of focus servo. |
| 5 | FEO | O | Focus drive output terminal. |
| 6 | FE- | I | Inversion input terminal of focus amplifier. |
| 7 | SRCH | I | Time constant terminal to make the focus search waveform. |
| 8 | TGU | I | Tracking high frequency changeover input terminal. |
| 11 | TAO | O | Tracking drive output terminal. |
| 12 | TA- | I | Inversion input terminal of tracking amplifier. |
| 13 | SL+ | I | No-inversion input terminal of sled amplifier. |
| 14 | SLO | O | Sled drive output terminal. |
| 15 | SL- | I | Inversion input terminal of sled amplifier. |
| 16 | FSET | I | Peak setting input of phase correction of focus tracking. |
| 17 | ISET | I | This terminal is flowed the current so that the focus search,tarcking jump,and sled kick height is decided. |
| 18 | SSTOP | I | Inner switch selection input terminal. |
| 20 | DIRC | I | This terminal is used when track jump. |
| 21 | LOCK | I | The sled runaway prevention circuit operates at the low level. |
| 22 | CLK | I | Serial data transfer clock input from microprocessor. |

| PIN NO. | SYMBOL | I/O | DESCIRPION |
|---|---|---|---|
| 23 | XLT | I | Latch input terminal for microprocessor. |
| 24 | DATA | I | Serial data input terminal for microprocessor. |
| 25 | XRST | I | Reset input terminal.Active low. |
| 26 | C.OUT | O | Signal output to count the track numbers. |
| 27 | SENS | O | This terminal outputs FZC,and SSTOP to according command from the microprocessor. |
| 29 | MIRR | O | Mirror comparator output terminal. |
| 30 | DFCT | O | Defect comparator output terminal. |
| 31 | ASY | I | Auto asymmetry control input terminal. |
| 32 | EFM | O | EFM comparator output terminal. |
| 33 | FOK | O | Focus OK comparator output terminal. |
| 34 | CC1 | O | Defect bottom hold output terminal. |
| 35 | CC2 | I | Defect bottom hold input terminal from CC1. |
| 37 | CB | I | Defect bottom hold capacitor connection terminal. |
| 38 | CP | I | Mirror hold capacitor connection terminal. |
| 39 | RFI | I | RF summing amplifier input terminal. |
| 40 | RFO | O | RF summing amplifier output terminal. |
| 42 | TZC | I | Tracking zero-cross comparator input terminal. |
| 43 | TE | I | Tracking error input terminal. |
| 44 | TDFCT | I | Capacitor connection terminal for time constant when defect. |
| 45 | ATSC | I | Window comparator input terminal for ATSC detection. |
| 46 | FZC | I | Focos zero-cross comparator input terminal. |
| 47 | FE | I | Focus error input terminal. |
| 48 | FDFCT | I | Capacitor connection terminal for time constant when defect. |

## SM5872CN (DA CONVERTER)



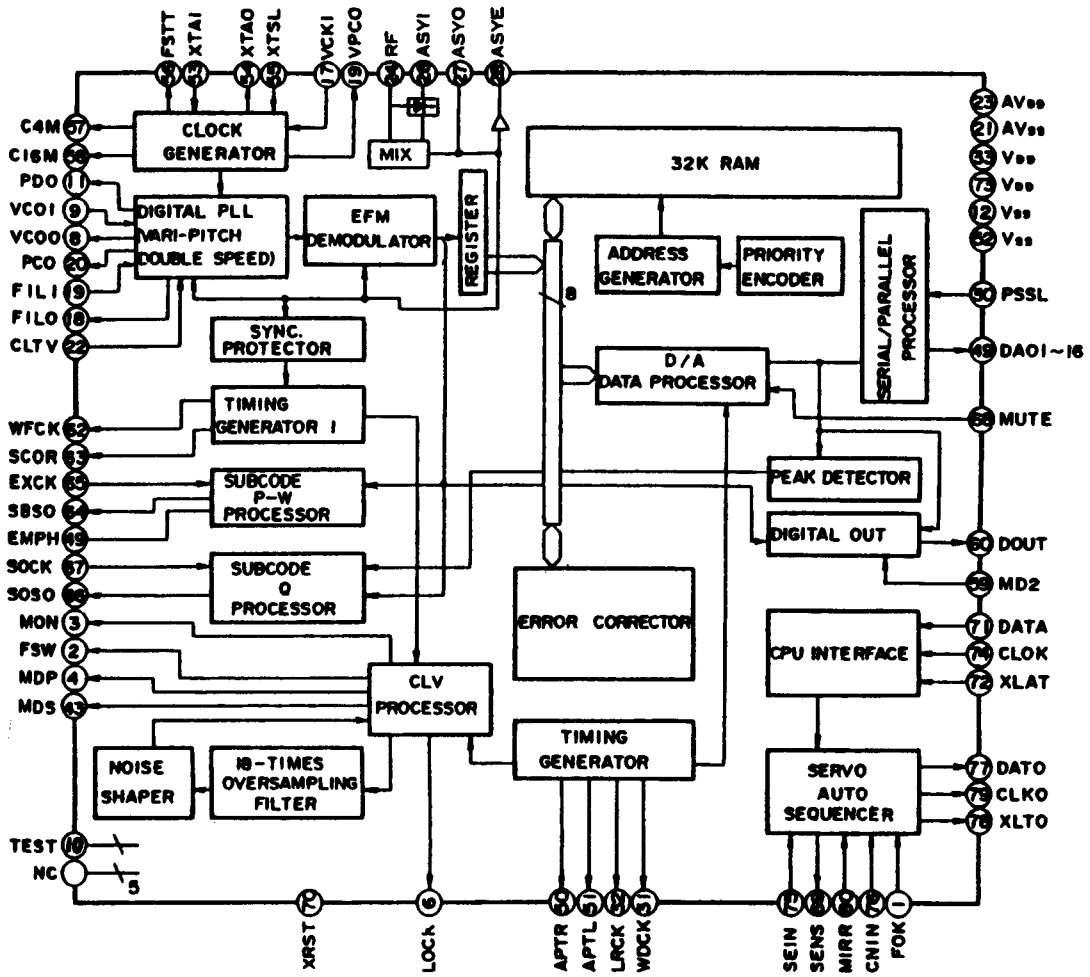

| Pin No. | Terminal | I/O | Description | Pin No. | Terminal | I/O | Description |
|---|---|---|---|---|---|---|---|
| 1 | XTO | O | Resonator section output pin | 28 | XTI | I | Resonator section input pin:384fs |
| 2 | XVss | | Ground for resonator system | 27 | XVDD | | Power supply for resonator section |
| 3 | CKSL | I | | 26 | AVDD4 | | Power supply for analog section |
| 4 | CKO | O | Output clock of resonator section:384fs | 25 | RO | O | PWM output pin of right channel |
| 5 | MUTEO | O | Infinity zero detector output | 24 | AVSS2 | | Ground pin for analog section |
| 6 | MUTEI | I | Muting input | 23 | RON | O | PWM output pin of right channel |
| 7 | MCOM | I | Interface switching control | 22 | AVDD3 | | Power supply for analog section |
| 8 | LRCI | I | Sampling rate clock for input data:H=L ch.L=R ch. | 21 | AVDD2 | | Power supply for analog section |
| 9 | BCKI | I | Bit clock input for input data | 20 | LON | O | PWM output pin of left channel |
| 10 | DI | I | Input data | 19 | AVSS1 | | Ground pin for analog section |
| 11 | MDT/FSEL1* | I | Microprocessor interface data when MCOM is H. | 18 | LO | O | PWM output pin of left channel |
| 12 | MCK/FSEL2* | I | Microprocessor interface clock when MCOM is H. | 17 | AVDD1 | | Power supply for analog section |
| 13 | MIEN/DEEM* | I | Microprocessor interface latch enable when MCOM is H | 16 | DVDD | | Power supply for digital section |
| 14 | RSTN | | System reset at the low level. | 15 | DVSS | | Ground pin for digital section |

*NOTE:MCOM=L

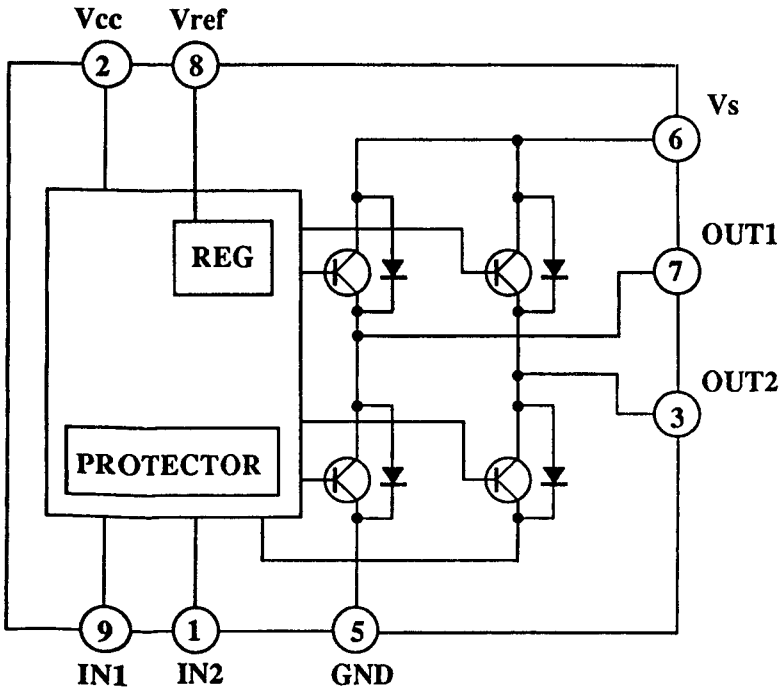
| | FSEL2 | |
|---|---|---|
| FSEL1 | L | H |
| L | 44.1kHz | 48.0kHz |
| H | (44.1kHz) | 32.0kHz |

#13: MCOM=L
DEEM:De-emphasis control

## CXD2500BQ (Digital Signal Processor)




## TA7291 (VOLUME MOTOR DRIVER)



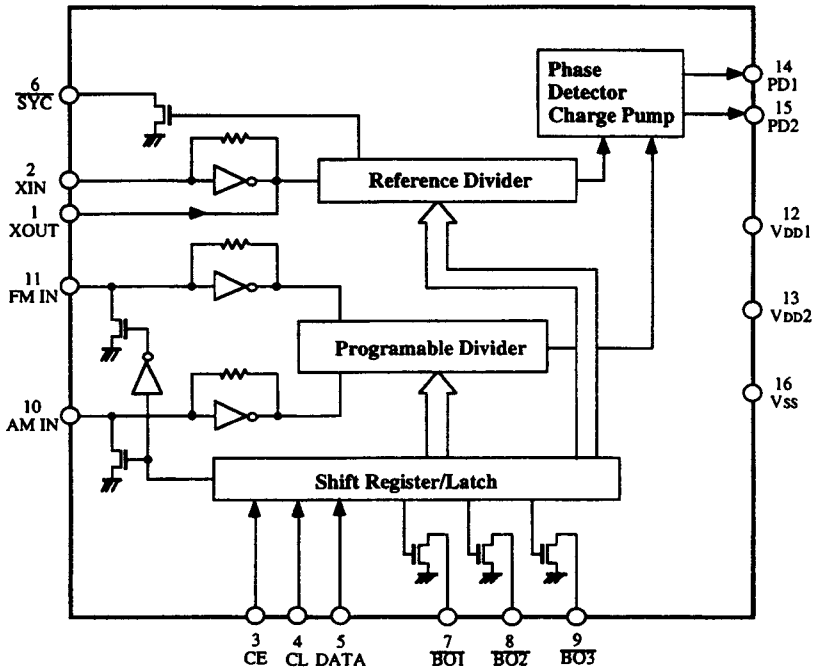

| INPUT | | OUTPUT | | |
|---|---|---|---|---|
| IN1 | IN2 | OUT1 | OUT2 | MODE |
| 0 | 0 | ∞ | ∞ | STOP |
| 1 | 0 | H | L | CW/CCW |
| 0 | 1 | L | H | CCW/CW |
| 1 | 1 | L | L | BRAKE |

CCW:Counter clockwise direction
CW:Clockwise direction

| NO. | SYMBOL | I/O | DESCRIPTION |
|---|---|---|---|
| 1 | FOK | I | Foucs Ok input |
| 2 | FSW | O | Output filter changeover output for spindle motor |
| 3 | MON | O | Spindle motor control output |
| 4 | MDP | O | Spindle motor servo control |
| 5 | MDS | O | Spindle motor servo control |
| 6 | LOCK | O | H when GFS is the high level |
| 7 | NC | | |
| 8 | VCOO | O | Oscillation circuit output for analog EFM PLL. |
| 9 | VCOI | I | Oscillation circuit input for analog EFM PLL. (8.6436MHz) |
| 10 | TEST | I | Test terminal |
| 11 | PDO | O | Charge pump output analog EFM PLL |
| 12 | Vss | | Ground terminal |
| 13-15 | NC | | |
| 16 | VPCO | O | PLL charge pump output for variable pitch |
| 17 | VCKI | I | Clock input for variable pitch from VCO (16.934MHz) |
| 18 | FILO | O | Filter output for master PLL. |
| 19 | FILI | I | Filter input for master PLL. |
| 20 | PCO | O | Charge pump output of master PLL |
| 21 | AVss | | Analog ground |
| 22 | CLTV | I | VCO control voltage input for master |
| 23 | AVDD | | Analog section power supply (+5V) |
| 24 | RF | I | EFM signal input |
| 25 | BIAS | I | Asymmetry circuit constant current input |
| 26 | ASYI | I | Asymmetry comparator voltage input |
| 27 | ASYO | O | EFM full swing output |
| 28 | ASYE | I | Asymmetry control circuit |
| 29 | NC | | |
| 30 | PSSL | O | Audio data output mode changeover input<br>Serial data at L and paraller data at H. |
| 31 | WDCK | I | D/A interface for 48 bits slot. Word clock f=2Fs. |
| 32 | LRCK | I | D/A interface for 48 bits slot. LR clock f=Fs. |
| 33 | VDD | | Power supply terminal (+5V) |
| 34-49 | | | Data output terminals |
| | | | PSSL=1 / PSSL=0 |
| 34 | DA16 | O | DA16 / Serial data of 48 bits slot |
| 35 | DA15 | O | DA15 / Bit clock of 48 bits slot |
| 36 | DA14 | O | DA14 / Serial data of 64 bits slot |
| 37 | DA13 | O | DA13 / Bit clock of 68 bits slot |
| 38 | DA12 | O | DA12 / LR clock of 68 bits slot |
| 39 | DA11 | O | DA11 / GTOP output |
| 40 | DA10 | O | DA10 / XUGF output |
| 41 | DA09 | O | DA09 / XPLCK output |
| 42 | DA08 | O | DA08 / GFS output |
| 43 | DA07 | O | DA07 / RFCK output |
| 44 | DA06 | O | DA06 / C2P0 output |
| 45 | DA05 | O | DA05 / XRAOF output |
| 46 | DA04 | O | DA04 / MNT 3 output |
| 47 | DA03 | O | DA03 / MNT 2 output |
| 48 | DA02 | O | DA02 / MNT 1 output |
| 49 | DA01 | O | DA01 / MNT 0 output |
| 50 | APTR | O | Control output for aperture correction. H when R ch. |
| 51 | APTL | O | Control output for aperture correction. H when L ch. |
| 52 | Vss | | Ground terminal |
| 53 | XTAI | I | Crystal oscillation circuit input of 16.9344MHz or 33.8688MHz input. |
| 54 | XTAO | O | Crystal oscillation circuit output of 16.9344MHz. |
| 55 | XTSL | I | Crystal selection input terminal. L when 16.9344MHz. H when 33.8688MHz. |
| 56 | FSTT | O | 2/3 divided output of pins 53 and 54. |
| 57 | C4M | O | 4.2336 MHz output |
| 58 | C16M | O | 16.9344 MHz output |
| 59 | MD2 | I | Digital output control input. On at high level. |
| 60 | DOUT | O | Digital output |
| 61 | EMPH | O | Emphasis control output. Active high. |
| 62 | WFCK | O | Write frame clock output |
| 63 | SCOR | O | Sub-code detection output. H when is detected SO or SI. |
| 64 | SBSO | O | Serial output of sub-code (P~W) |
| 65 | EXCK | I | Clock input for read out SQSO. |
| 66 | SQSO | O | Sub Q 80 bits, PCM peak, and level data 16 bits output. |
| 67 | SQCK | I | Clock input for read out SQSO |
| 68 | MUTE | O | Muting control output. Active H. |
| 69 | SENS | | Sens output. Output to the microprocessor |
| 70 | XRST | I | System reset. Reset at the low level. |
| 71 | DATA | I | Serial data input from the microprocessor. |
| 72 | XLTA | I | Latch input from the microprocessor. Latch the serial data at the trailing. |
| 73 | VDD | | Power supply treminal |
| 74 | CLOK | I | Serial data transfer clock input from microprocessor |
| 75 | SEIN | I | Sens input from SSP |
| 76 | CNCI | I | Track jump numbers count signal input |
| 77 | DATO | O | Serial data output to SSP |
| 78 | XLTO | O | Serial data latch output to SSP. Latch at trailing. |
| 79 | CLKO | O | Serial data transfer clock output to SSP. |
| 80 | MIRR | I | Mirror signal input |

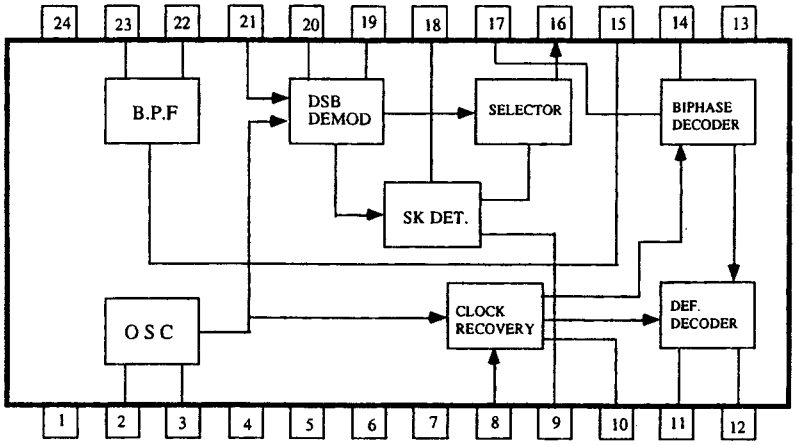
Note: SSP: IC101 CXA1372Q

## LM7001 (PLL Synthesizer and Controller)



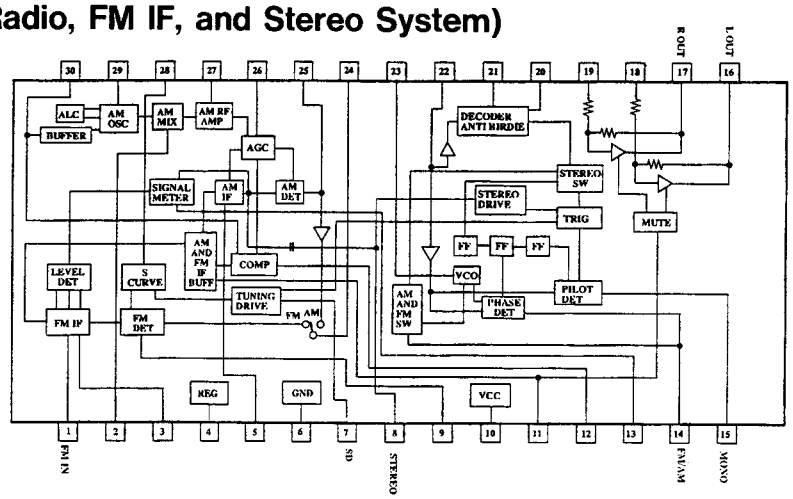

| Pin No. | Terminal | Description |
|---|---|---|
| 1 | XOUT | Connect the 7.2MHz crystal resonator. |
| 2 | XIN | |
| 3 | CE | Chip enable terminal. Connect to the terminal PLLCE1 of microprocessor. |
| 4 | CL | Serial clock input terminal. Connect to the terminal PLLCL of microprocessor. |
| 5 | DATA | Serial data input terminal. Connect to the terminal PLLDATA of microprocessor. |
| 6 | $\overline{SYN}$ | Not used. |
| 7 | $\overline{SAT}$/CANLE | Power source control terminal for DSR. Cable at the high level and Satellite at low. |
| 8 | LPF | LPF selector output. |
| 9 | ANT | Antenna selector output. A at high level and B at low level. |
| 10 | AMIN | AM local oscillator input terminal. |
| 11 | FMIN | FM local oscillator input terminal. |
| 12 | VDD1 | Power source terminal for back-up. |
| 13 | VDD2 | Power source terminal. |
| 14 | PD1 | Phase comparator output |
| 15 | PD2 | Phase comparator output |
| 16 | Vss | Ground terminal |

## μPC1346CS (RDS DECODER)



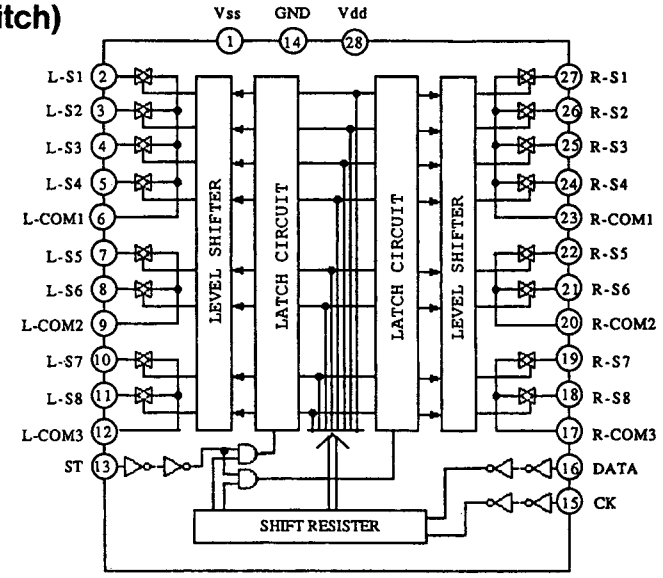

| No. | Terminal | Description | No. | Terminal | Description |
|---|---|---|---|---|---|
| 1 | Vcc | Supply voltage for the digital circuit | 13 | GND | Ground for the analog circuit |
| 2 | OSC IN | Resonator input | 14 | INTEG | Integrating filter terminal |
| 3 | OSC OUT | Resonator output | 15 | BPF ADJ | Adjustment fc of band pass filter |
| 4 | GND | Ground for the digital circuit | 16 | PSK OUT | Biphase signal output |
| 5 | TEST1 | Test input | 17 | PSK IN | Biphase decoder input |
| 6 | TEST2 | Test input | 18 | LPF SK | Low pass filter for the detection SK |
| 7 | OP.CTL | Control input of the operation stop | 19 | LPF Q | Low pass filter for the crossed detector |
| 8 | S/L CTL | Mode control input of the synchonizing detection | 20 | LPF I | Low pass filter for the synchronizing detector |
| 9 | SK OUT | SK detection output | 21 | DSB IN | DSB demodulator circuit input |
| 10 | RDS OUT | RDS synchonizing detection output | 22 | BPF OUT | Band pass filter output |
| 11 | CLOCK OUT | Bit rate clock output | 23 | BPF IN | Band pass filter input |
| 12 | DATA OUT | RDS data output | 24 | Vcc | Supply voltage for analog circuit |

## LA1836 (AM Radio, FM IF, and Stereo System)




| No. | Terminal Descriptions | No. | Terminal Descriptions |
|---|---|---|---|
| 1 | FM IF amplifier input terminal | 13 | Pilot filter and monaural selector terminal |
| 2 | Power supply terminal | 14 | FM Multiplex input terminal |
| 3 | FM tuning level adjustment terminal | 15 | AM detector signal input terminal |
| 4 | Ground terminal | 16 | FM/AM detector signal output terminal |
| 5 | FM discriminator terminal | 17 | AM AGC terminal |
| 6 | Tuning indicator terminal | 18 | AM IF input terminal |
| 7 | Stereo indicator terminal | 19 | AM mixer output terminal |
| 8 | IF request and Muting terminal | 20 | AM antenna terminal |
| 9 | IF signal terminal | 21 | FM band width adjustment terminal |
| 10 | Right channel output terminal | 22 | AM local oscillator connection terminal |
| 11 | Left channel output terminal | 23 | Reference voltage terminal |
| 12 | PLL filter/AM/FM band selector terminal | 24 | AM local oscillator output terminal |

## TC9164N (Analog Switch)




# REMOVEMENT OF TRAY ASS'Y

Remove the top cover.

Turn the locked screw to the clockwise to release the lock of gear.(Refer fig.1)

Pull out the tray ass'y.

Remove the stopper.(Refer fig.2)

Press the tray stopper to the arrow mark direction and remove the tray ass'y.

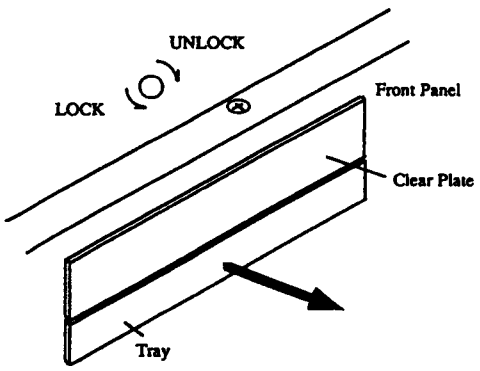



fig.1

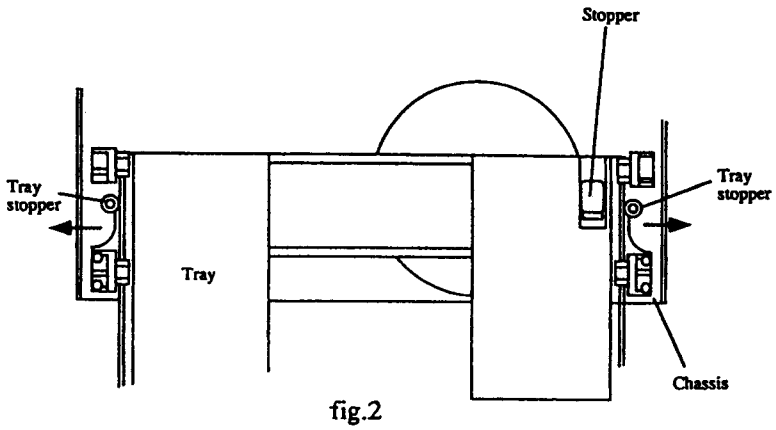
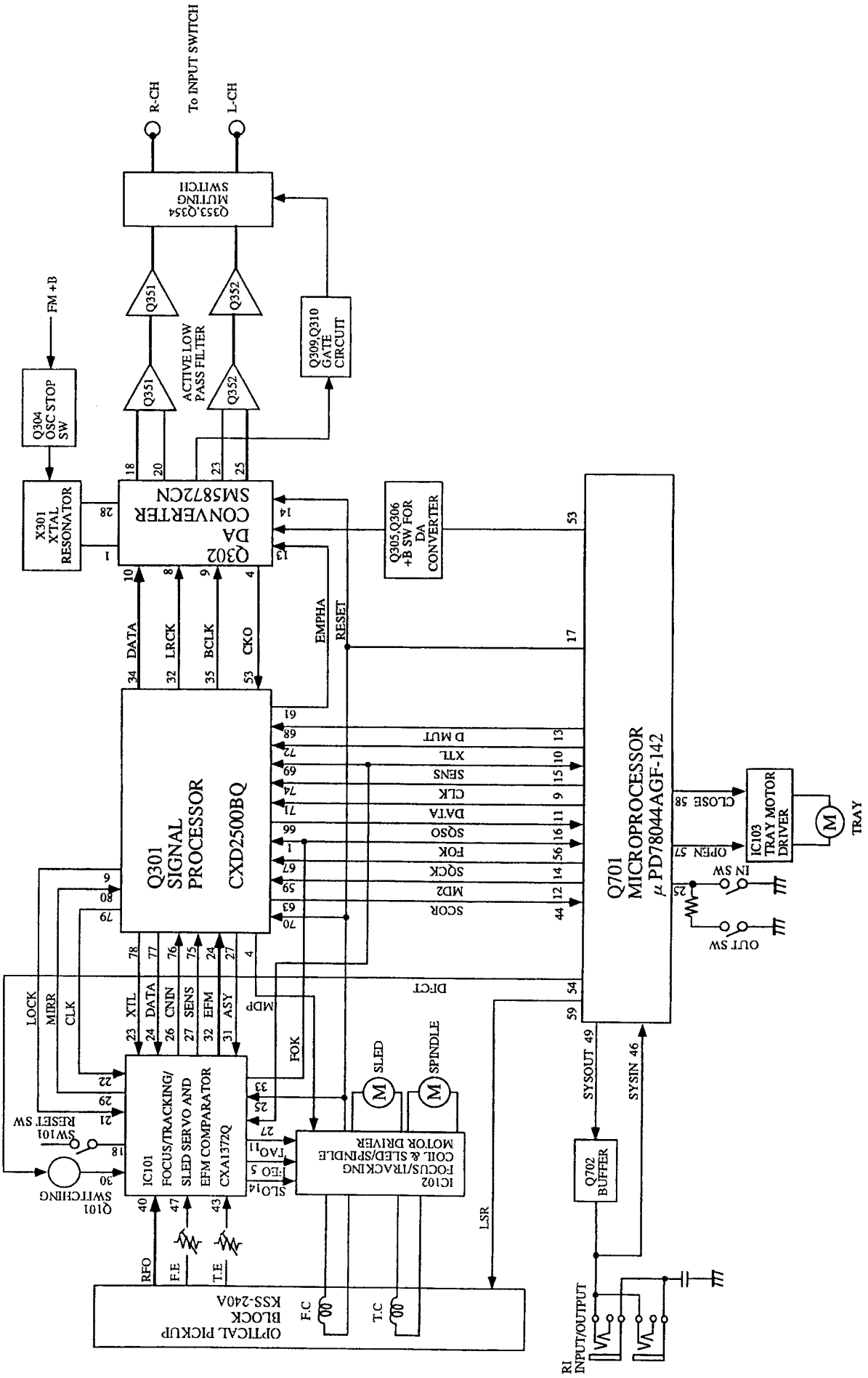



fig.2

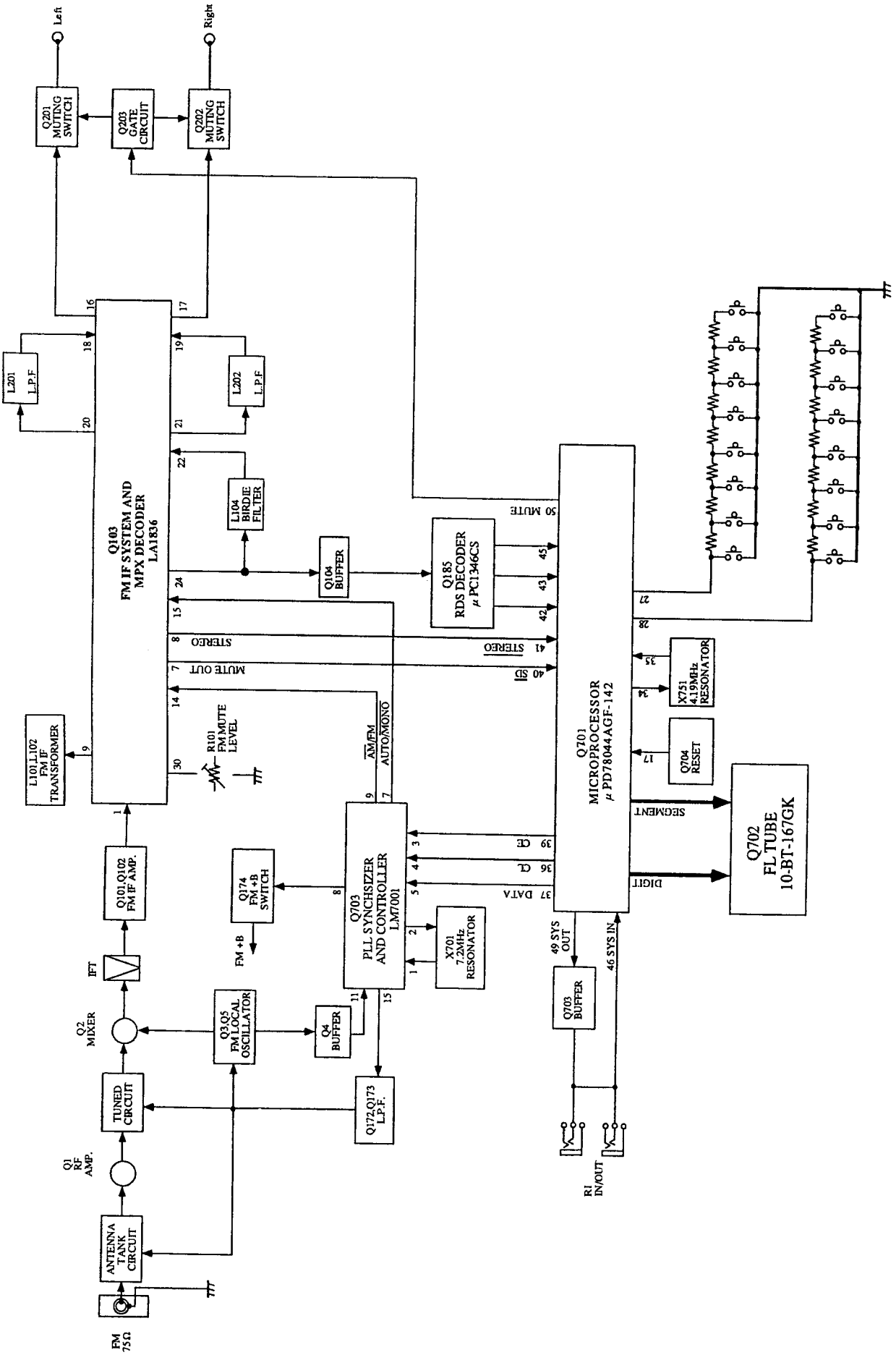
# BLOCK DIAGRAM

— CD section —

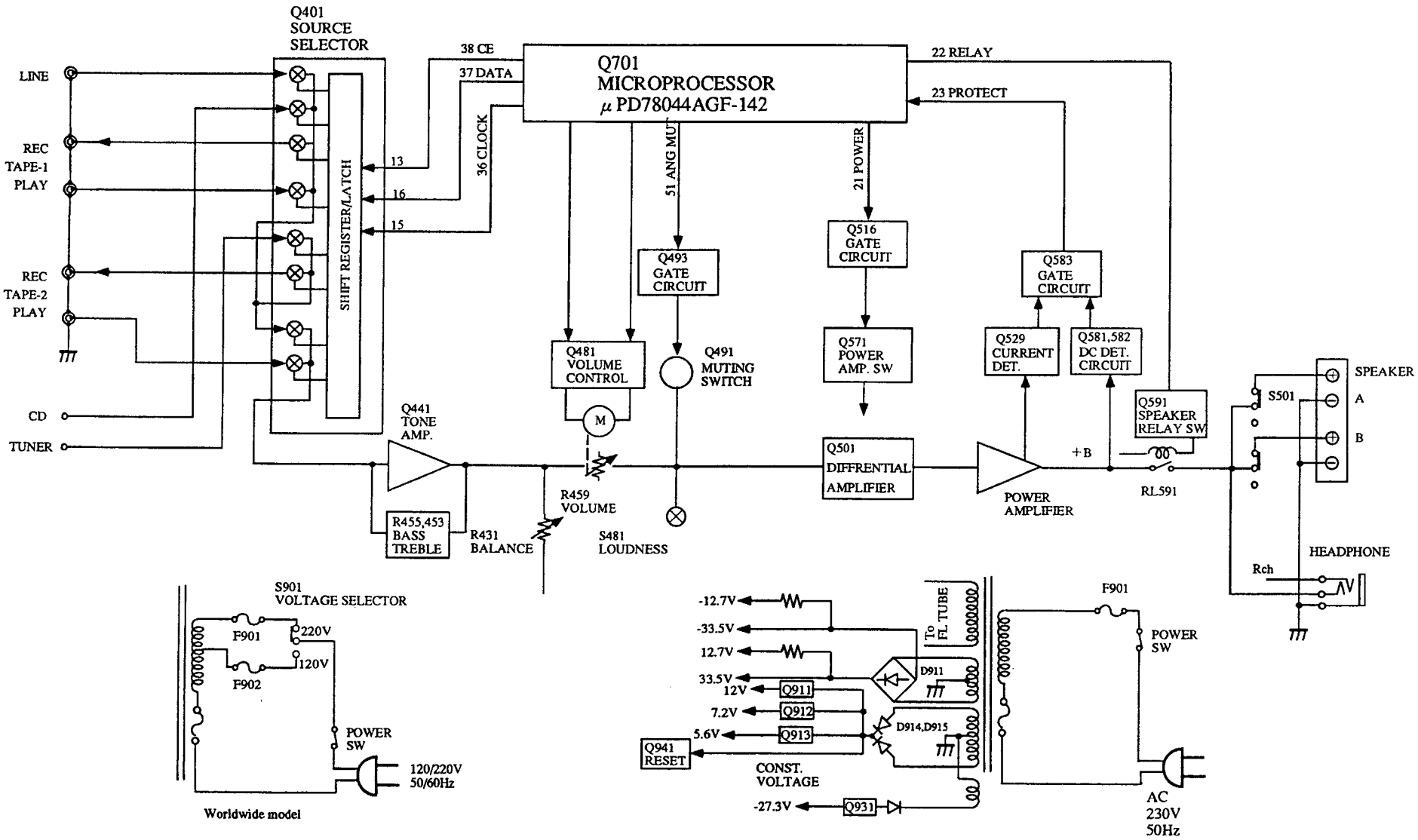


# BLOCK DIAGRAM

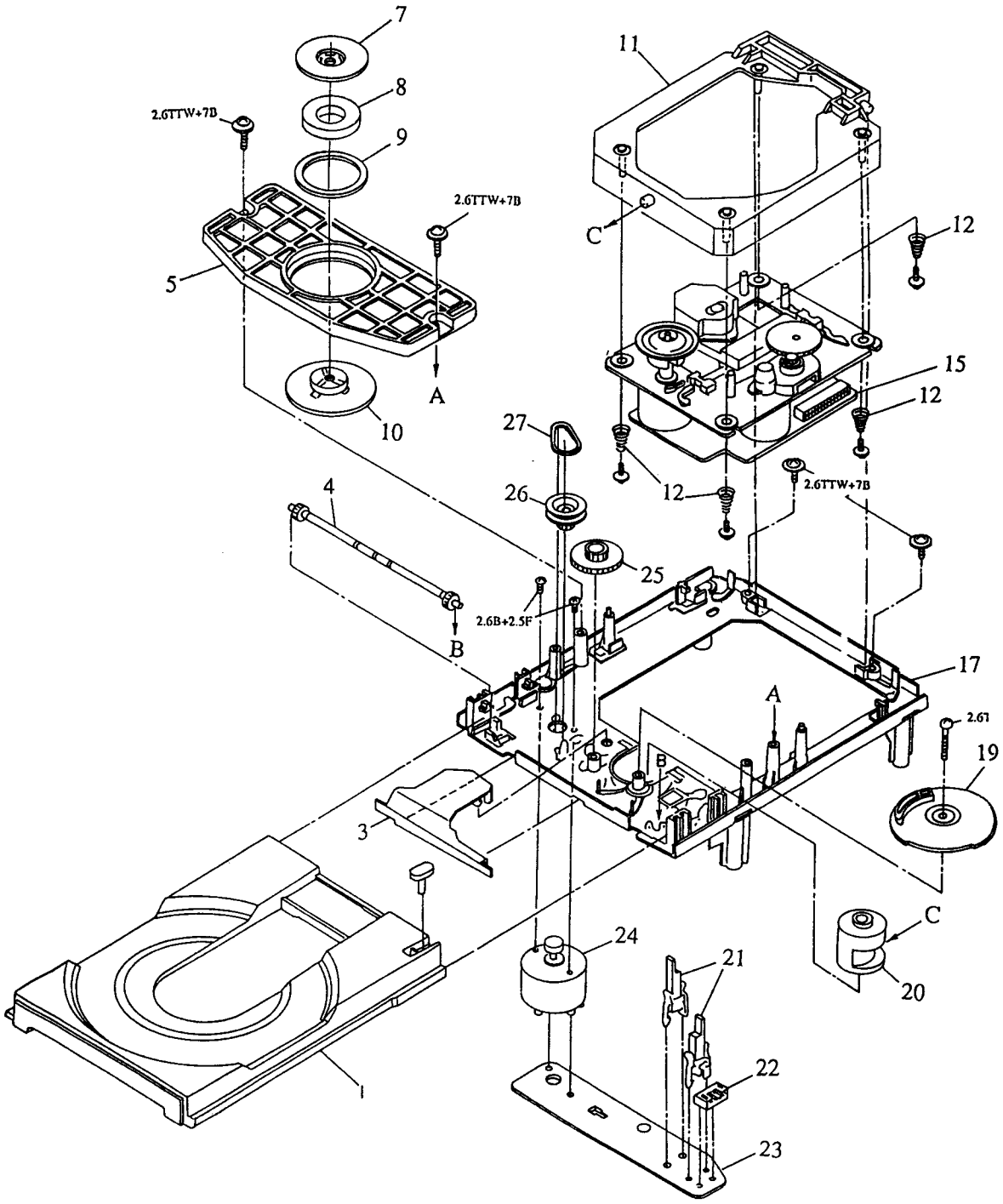
– Tuner section –

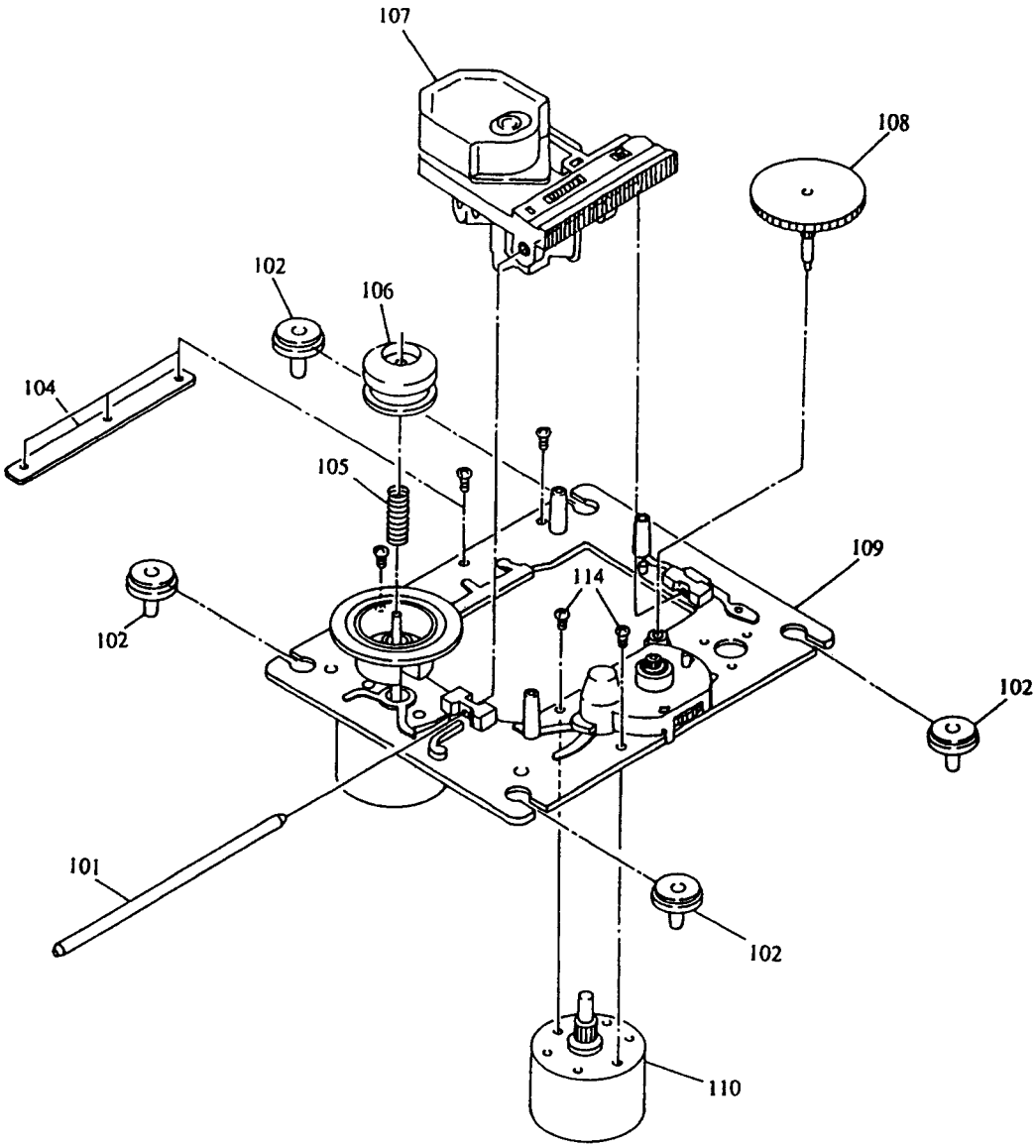


## –Amplifier section–



# MECHANISM-EXPLODED VIEW






## PARTS LIST

| REF.NO. | PART NO. | DESCRIPTION |
|---|---|---|
| 1 | 24840053 | Tray |
| 3 | 24822014 | Gear cover |
| 4 | 24810020 | Tray gear |
| 5 | 24840061 | Chucking plate |
| 7 | 24830003 | Chucking yoke |
| 8 | 24832004 | Magnet |
| 9 | 24836013 | Damper |
| 10 | 24810024 | Chucking plate |
| 11 | 24802012 | Sub-chassis |
| 12 | 24820023 | Spring |
| 15 | 24840075 | CD servo pcb ass'y |
| 17 | 24802013 | Main chassis |
| 19 | 24810021 | Drive gear |
| 20 | 24840063 | Control cam |
| 21 | 24840064 | Leafswitch |

| REF.NO. | PART NO. | DESCRIPTION |
|---|---|---|
| 22 | 25055369 | NPLG-5P352,Plug |
| 23 | 24840066 | Loading motor pc board |
| 24 | 24840067 | Loading motor |
| 25 | 24810022 | Middle gear |
| 26 | 24810025 | Loading plate |
| 27 | 24816008 | Belt |
| 101 | 24828006 | Sled shaft S |
| 102 | 24836014 | Insulator S |
| 104 | 24822015 | Plate S |
| 105 | 24820024 | Spring |
| 106 | 24824003 | Center ring |
| 107 | 24110011 | KSS-240A,Optical pickup |
| 108 | 24810023 | Wheel |
| 109 | 24802014 | Chassis |
| 110 | 24804012 | Motor gear |

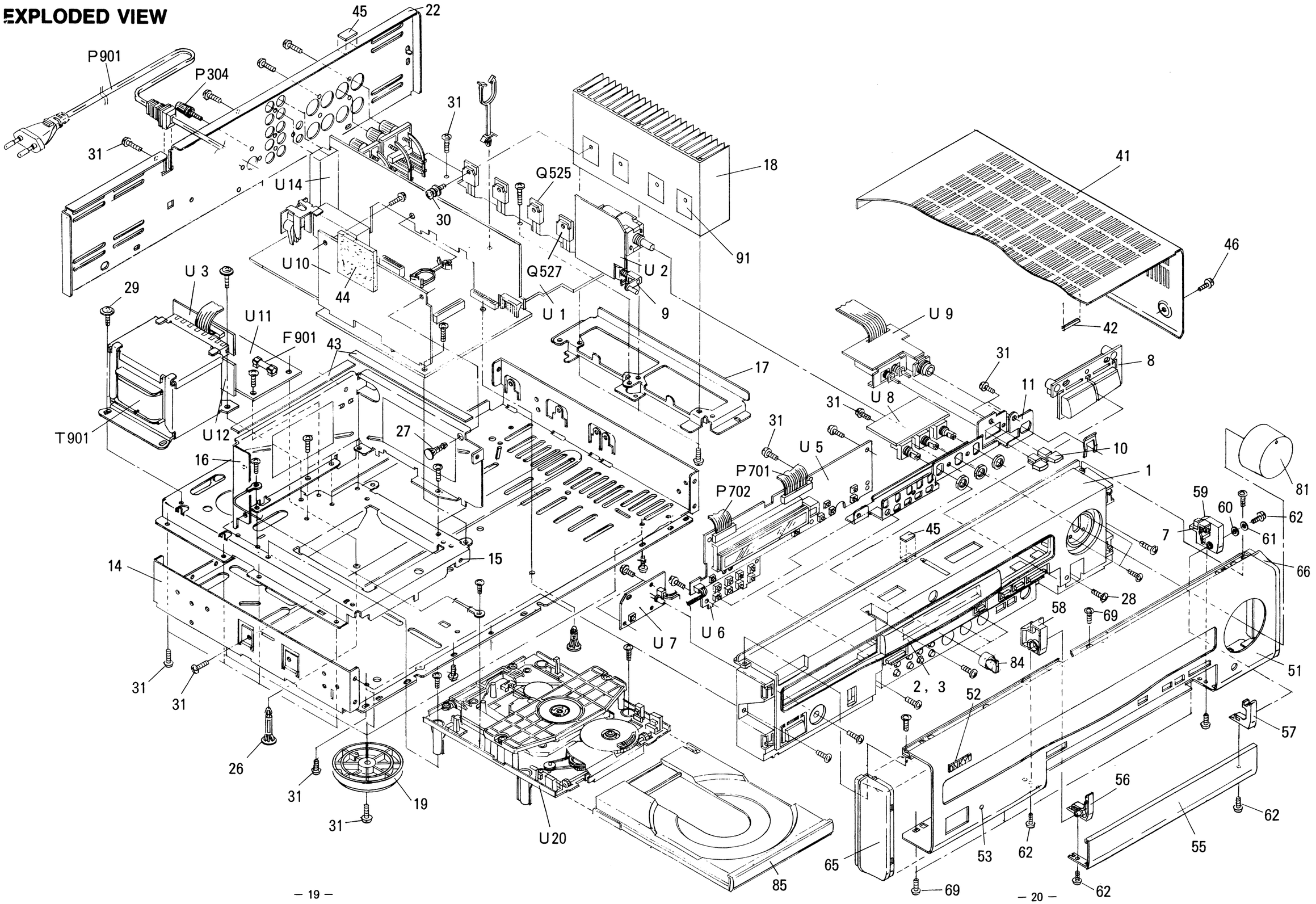
# PARTS LIST

| REF.NO. | PART NO. | DESCRIPTION |
|---|---|---|
| 1 | 27110876 | Front bracket <S> |
| | 27110875 | Front bracket <B> |
| 2 | 28133338 | Back plate |
| 3 | 28191721 | Clear plate |
| 4 | 27262594 | Plate F <S> |
| | 27262595 | Plate F <B> |
| 7 | 27230025 | Push latch |
| 8 | 28325163 | Knob, Play <S> |
| | 28325162 | Knob, Play <B> |
| 9 | 38325165 | Knob, Loudness <S> |
| | 38325166 | Knob, Loudness <B> |
| 10 | 28325168 | Knob, Speaker <S> |
| | 28325169 | Knob, Speaker <B> |
| 11 | 27130751 | Bracket F |
| 14 | 27100301 | Chassis |
| 15 | 27130752 | Bracket M |
| 16 | 27130753 | Bracket L |
| 17 | 27130754 | Bracket H |
| 18 | 27160355 | Radiator |
| 19 | 27175292 | Leg |
| 22 | 27122115 | Rear panel <P> |
| | 27122116 | Rear panel <W> |
| 26 | 27190428A | KGLS-10RF,Holder |
| 27 | 27190657 | KGLS-18RF,Holder |
| 28 | 838430107 | 3TTB+10S(BC), Self-tapping screw |
| 29 | 830440089 | 4TTC+8C(BC), Self-tapping screw |
| 30 | 801433 | 3SMS8W.SW+14B(BC), Self-tapping screw |
| 31 | 838130088 | 3TTB+8B, Self-tapping screw |
| 41 | 28184608 | Top cover <S> |
| | 28184609 | Top cover <B> |
| 42 | 28140302 | 3×60×10,Cushion |
| 43 | 28140720 | 0.5×150×10,Cushion |
| 44 | 28141313 | 3×20×3,Cushion |
| 45 | 28141288 | 0.8×10×15,Cushion |
| 46 | 838230088 | 3TTB+8B(Ni), Self-tapping screw <S> |
| | 838430088 | 3TTB+8B(BC), Self-tapping screw <B> |
| 51 | 1H270121 | Front panel ass'y <S> |
| | 1H271121 | Front panel ass'y <B> |
| 52 | 28135199 | Badge |
| 53 | 28198777 | Facet |
| 55 | 28148315 | Door <S> |
| | 28148315 | Door <B> |
| 56 | 28180115A | Hinge L <S> |
| | 28180116A | Hinge L <B> |
| 57 | 28180117A | Hinge R <S> |
| | 28180118A | Hinge R <B> |
| 58 | 27190958 | Holder L <S> |
| | 27190959 | Holder L <B> |
| 59 | 27190961 | Holder R <S> |
| | 27190960 | Holder R <B> |
| 60 | 870148 | WW-4, Wave washer |
| 61 | 87642607 | W2.6×7F(BC), Washer |
| 62 | 838426088 | 2.6TTB+8B(BC), Self-tapping screw |
| 65 | 28125293 | End cap L <S> |
| | 28125293 | End cap L <S> |
| 66 | 28125296 | End cap R <S> |
| | 28125296 | End cap R <S> |
| 69 | 838130088 | 3TTB+8B,Self-tapping screw |

| REF.NO. | PART NO. | DESCRIPTION |
|---|---|---|
| 81 | 28325171 | Knob, Volume <S> |
| | 28325172 | Knob, Volume <B> |
| 84 | 28325178 | Knob, Selector <S> |
| | 28325157 | Knob, Selector <B> |
| 85 | 28148313 | Door, CD <S> |
| | 28148312 | Door, CD <B> |
| 91 | 223021 | TBM-51W-9043, Isolation sheet |
| F901 | 252073 | ⚠ 1.6A-SE-EAK, Primary fuse |
| F902 | 252150 | ⚠ 3.15A-TSC, Primary fuse <W> |
| P303 | 2046221512 | NCFC6-221512, Flexible flat cable |
| P304 | 25060044 | 3×14, Terminal GND |
| P701 | 2047251512 | NCFC7-251512, Flexible flat cable |
| P702 | 2047171012 | NCFC7-171012, Flexible flat cable |
| P901 | 253207AHIT | AS-CEE, Power supply cord |
| Q525,Q526 | 2202923, | * 2SC5196-O, |
| | 2202922, | * 2SC5196-R, |
| | 2202373, | * 2SC4466-O, |
| | 2202374 or | * 2SC4466-Y or |
| | 2202375 | * 2SC4466-P, Transistor |
| Q527,Q528 | 2202913, | * 2SA1939-O, |
| | 2202912, | * 2SA1939-R, |
| | 2202363, | * 2SA1693-O, |
| | 2202364 or | * 2SA1693-Y or |
| | 2202365 | * 2SA1693-P, Transistor |
| T901 | 2301127 | ⚠ NPT-1247P, Power transformer <P> |
| | 2301128 | ⚠ NPT-1247DG, Power transformer <W> |
| U20 | 24800009CY | NCD-130S, CD mechanism ass'y |
| U1 | 1H270513-1 | NAAR-5513-1, Main circuit pc board ass'y <P> |
| | 1H270513-1A | NAAR-5513-1A, Main circuit pc board ass'y <W> |
| U2 | 1H270514-1 | NAETC-5514-1, Volume pc board ass'y |
| U3 | 1H270515-1 | NAETC-5515-1, Secondary circuit pc board ass'y |
| U5 | 1H270517-1 | NADIS-5517-1, Display circuit pc board ass'y |
| U6 | 1H270518-1 | NASW-5518-1, Operation switch pc board ass'y <P> |
| | 1H270518-1A | NASW-5518-1A, Operation switch pc board ass'y <W> |
| U7 | 1H270519-1 | NASW-5519-1, Power switch pc board ass'y <P> |
| | 1H270519-1A | NASW-5519-1A, Power switch pc board ass'y <W> |
| U8 | 1H270520-1 | NAAF-5520-1, Tone circuit pc board ass'y |
| U9 | 1H270521-1 | NAAF-5521-1, Headphone terminal pc board ass'y |
| U10 | 1H270522-1 | NADG-5522-1, CD circuit pc board ass'y |
| U11 | 1H270523-1 | NAPS-5523-1, Power supply circuit pc board ass'y <P> |
| | 1H270523-1A | NAPS-5523-1A, Power supply circuit pc board ass'y <W> |
| U12 | 1H270524-1 | NAETC-5524-1, Primary circuit pc board ass'y |
| U13 | 1H270525-1 | NASW-5525-1, Voltage selector switch pc board ass'y <W> |
| U14 | 1H270526-1 | NAAF-5526-1, Input terminal pc board ass'y |

NOTE: <P>:230V model only
<W>:Worldwide model only
<S>:Silver model only
<B>:Black model only

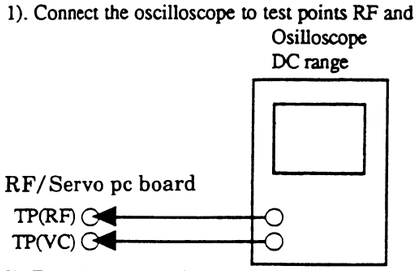
## EXPLODED VIEW



# ADJUSTMENT PROCEDURES

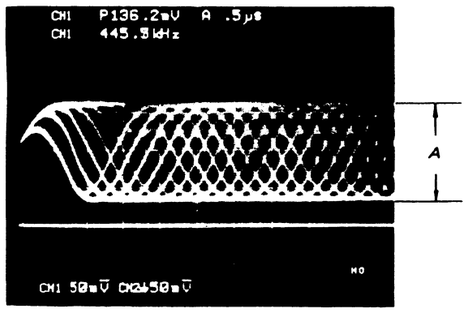
It is not necessary to perform the adjustment of optical pickup.
This confirmation should be made when replacing the optical pickup.

1). Connect the oscilloscope to test points RF and VC.




2). Turn the power switch on.
3). Load the test disc YEDS-18 on the tray and press the play button.
4). Confirm that the waveform on the oscilloscope is optimum eye pattern and optimum level as shown photo 1.
Optimum eye pattern means that shape "◇" can be clearly distinguished at the center of the waveform.

*RF signal waveform*




*A = 1.2V ± 0.2 (Vp-p)*

**REFERENCE**

**Focus/Tracking Gain Adjustment**

A frequency response analyzer is necessary in order to perform this adjustment exactly.

However, this gain has a margin, so even if it is slightly off, there is no problem. Therefore, do not perform this adjustment.

Focus/tracking gain determines the pick-up follow-up (vertical and horizontal) relative to mechanical noise and mechanical shock when the 2-axis device operate.

However, as these reciprocate, the adjustment is at the point where both are satisfied.

- When gain is raised, the noise when the 2-axis device operates increases.
- When gain is lowered, it is more susceptible to mechanical shock and skipping occurs more easily.
- When gain adjustment is off, the symptoms below appear.

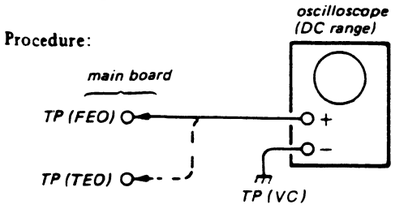
| Symptoms \ Gain | Focus | Tracking |
|---|---|---|
| • The time until music starts becomes longer for STOP →▷PLAY or automatic selection (⏮, ⏭buttons pressed. (Normally takes about 2 seconds.) | low | low or high |
| • Music does not start and disc continues to rotate for STOP→▷PLAY or automatic selection (⏮, ⏭buttons pressed.) | – | low |
| • Sound is interrupted during PLAY. Or time counter display stops progressing. | – | low |
| • More poise during 2-axis device operation. | high | high |

The following is a simple adjustment method.

– Simple Adjustment –

**Note:** Since exact adjustment cannot be performed, remember the positions of the controls before performing the adjustment. If the positions after the simple adjustment are only a little different, return the controls to the original position.

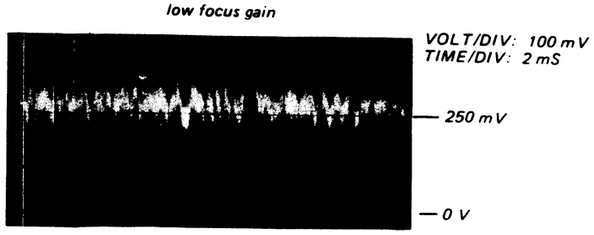
**Procedure:**



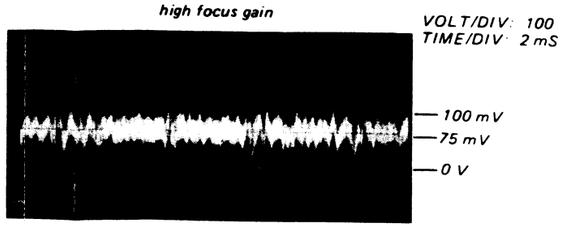

1. Keep the set horizontal.
(If the set is not horizontal, this adjustment cannot be performed due to the gravity against the 2 axis device.)
2. Insert disc (YEDS-18) and press ▷PLAY button.
3. Connect oscilloscope to RF/Servo board TP (FE).
4. Adjust RV102 so that the waveform is as shown in the figure below. (focus gain adjustment)

- Incorrent Examples (DC level changes more than on adjusted waveform)

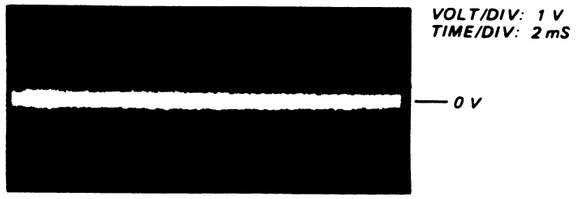
*low focus gain*




*high focus gain*



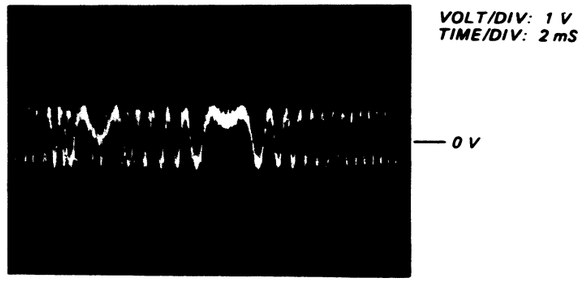

5. Connect oscilloscope to RF/Servo board TP (TE).
6. Adjust RV101 so that the waveform is as shown in the figure below. (tracking gain adjustment)



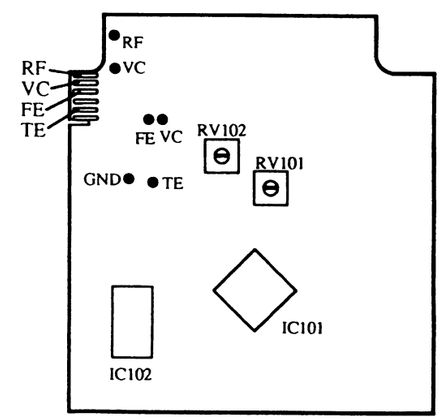

- Incorrect Examples (fundamental wave appears)

*low tracking gain*

*high tracking gain*
*(higher fundamental wave than for low gain)*




**Adjustment Location:** RF/Servo board



## Preparation

### 1. Input

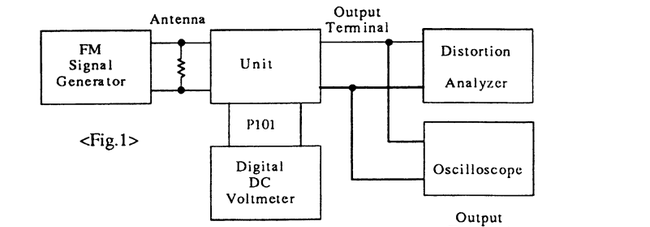
FM mono: 1kHz, 75kHz devi., 60dB/$\mu$ V
FM stereo: 1kHz, 67.5kHz devi., 60dB/$\mu$ V
Pilot signal 19kHz 7.5kHz devi.
AM: 400Hz, 30% mod.

### 2. Outputs

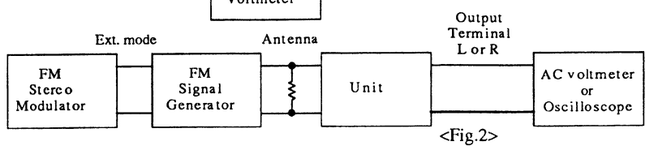
Connect the non-inductive type resistor of 8 ohms to the all speaker terminals unless otherwise noted.

FM Adjustment

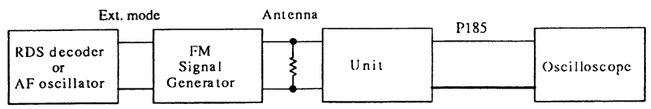
| Item | Step | Connection of instrument | FM SG output | Stereo modulator output | Tuning frequency | Output indicator | Adjustment point | Adjust for | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| FM IF/RF | 1 | Fig.1 | 99.0MHz 1kHz 75kHz devi. 65dBf(60dB $\mu$) | — | 99.0MHz | DC voltmeter | L101 | 0±20mV | FM MUTE/MODE switch:OFF/MONO Repeat the steps 1 and 3 until no further adjustment is necessary. |
| | 2 | | | | | AC voltmeter | IFT on the front end | Maximum | |
| | 3 | | | | | Distortion analyzer | L102 | Minimum | |
| Stereo Distortion | | Fig.2 | 99.0MHz Ext. mod.65dBf(60dB) | Channel L or R 1kHz | 99.0MHz | Distortion analyzer | IFT on the front end | Minimum | FM MUTE/MODE switch:ON/STEREO Don't turn more than ±90° |
| Muting Level | 1 | Fig.1 | 99.0MHz 1kHz 22.5kHz devi. 19.2dBf(14dB) | — | 99.0MHz | Oscilloscope | R101 | Signal output | FM MUTE/MODE switch:ON/STEREO |
| | 2 | | 99.0MHz 1kHz 22.5kHz devi. 18.2dBf(13dB) | | | | | No signal | |
| RDS | | Fig.3 | 99.0MHz Ext. mod.60dB | RDS data or 57kHz 3% devi. | 99.0MHz | Oscilloscope | R185 | Maximum | |



<Fig.1>



<Fig.2>



<Fig.3>

### Idling Current Adjustment

Connect the DC voltmeter to the terminals P521, and P522 ($V_{CT}$ and $I_{ID}$) on the main circuit pc board.
Adjust the trim resistors R531 and R532 so that the indicator of voltmeter becomes 7.5 ± 1.5mV.
NOTE: Adjust after switching on for 5 minutes.
Set Volume knob to the minimum position.



# SERVICE PROCEDURES

**1. Replacing the fuses**

This symbol located near the fuse indicates that the fuse used is fast operating type. For continued protection against fire hazard, replace with same type fuse. For fuse rating refer to the marking adjacent to the symbol.

Ce symbole indique que le fusible utlise est a rapide. Pour une protection permanente, n'utiliser que des fusibles de meme type. Ce darnier est indique la qu le present symbol est appose.

| CIRCUIT NO. | PART NO. | DESCRIPTION |
|---|---|---|
| F901 | 252063 | 0.5A-SE-EAK, Primary |
| F902 | 252150 | 3.15A-TSC, Primary (Worldwide model only) |

**2. To Initialize the unit**

This device employs a microprocessor to perform various functions and operations. If interference generated by an external power supply, radio wave, or other electrical source results in accident which causes the specified operations and functions to operate abnormally.
To perform a result, please follow the procedure below.

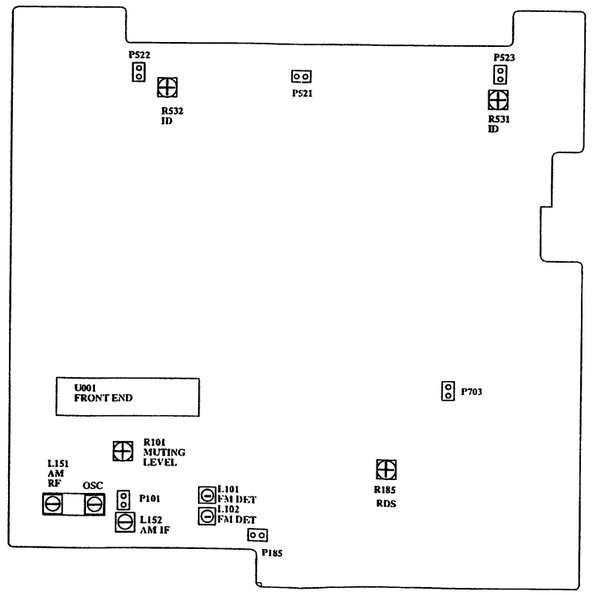
1. **Press and hold down the CD button, then press the POWER button.**
2. **Press the POWER button.**
3. **After "clear" is displayed, the preset memory and each mode stored in the memory, are initialized and will return to the factory settings.**

**3. Safety-check out**

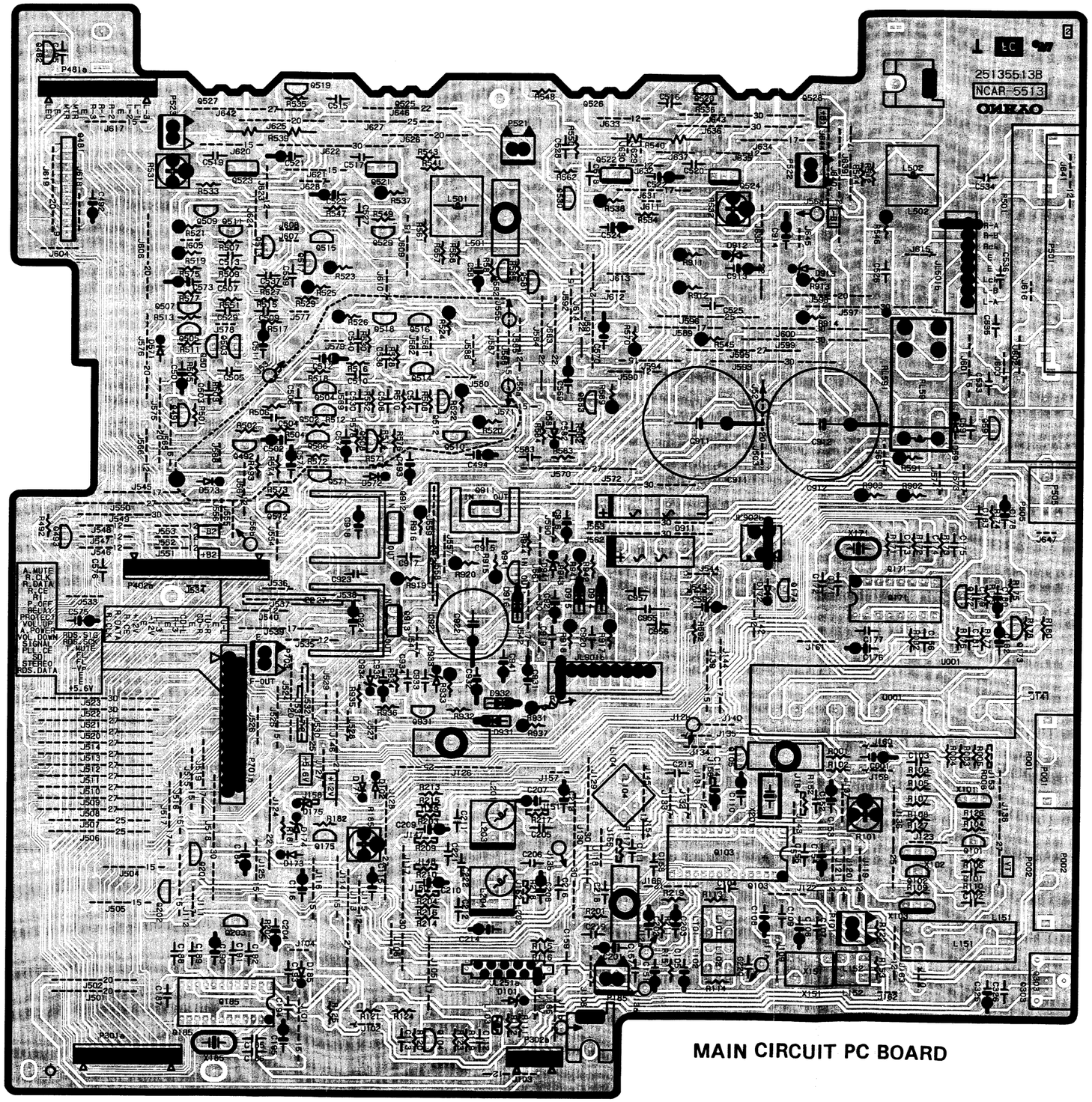
After correcting the original service problem, perform the following safety check before releasing the set to the customer. Connect the insulating-resistance tester between the plug of power supply cord and the screw on the back panel.
Specifications: More than 10 MΩ at 500V.

**4. Memory preservation**

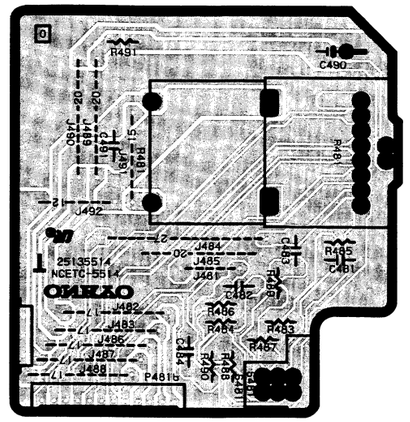
This unit does not require memory preservation batteries.
A built-in memory power back-up system preserves contents of the memory during power failures and even when the unit is unplugged.
The unit must be plugged in and the power switch turned on and off once in order to charge the back-up system. Note that since this is not a permanent memory, the power switch must be turned on and off a few times each month the keep the back-up system operative.
The period of the time during which memory contents are preserved after power has last been turned off varies depending on climate and placement of the unit. On the average, memory contents are protected over a period of 3 to 4 weeks (a minimum of 2 weeks) after the last time power has been turned off. This period is shorted when the unit is exposed to very high humidity or used in an area with an extremely humid climate.



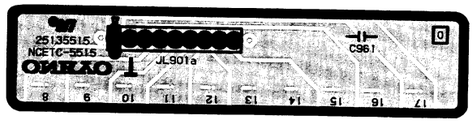
## PC BOARD VIEW FROM BOTTOM SIDE




MAIN CIRCUIT PC BOARD



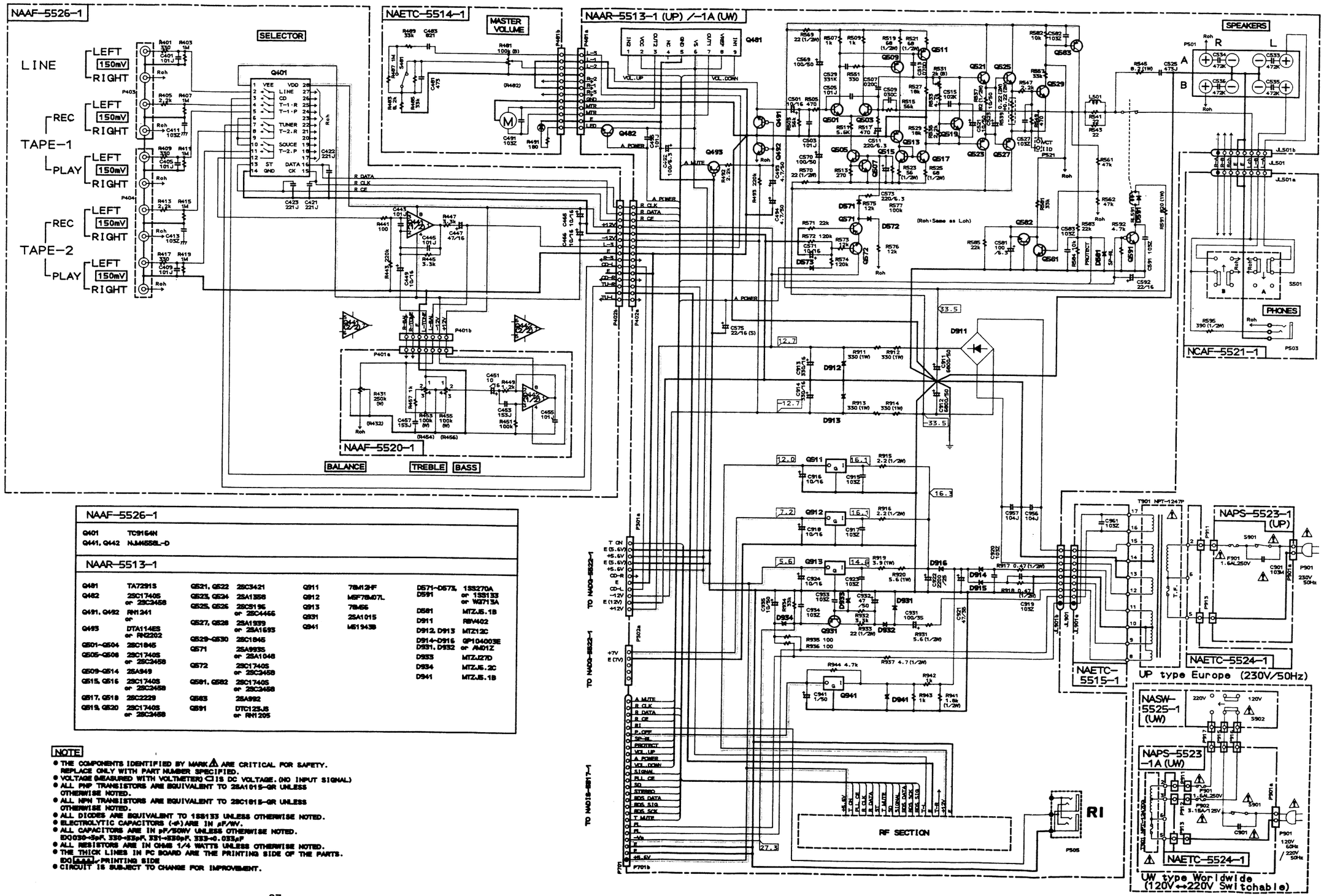

VOLUME PC BOARD




SECONDARY CIRCUIT PC BOARD

# SCHEMATIC DIAGRAM

– Audio section –




| NAAF-5526-1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Q401 | TC9164N | | | | | | |
| Q441, Q442 | NJM4558L-D | | | | | | |
| **NAAR-5513-1** | | | | | | | |
| Q481 | TA72913 | Q521, Q522 | 2SC3421 | Q911 | 7BM12HF | D571–D573, D591 | 1SS270A or 1SS133 or W07T3A |
| Q482 | 2SC1740S or 2SC3458 | Q523, Q524 | 2SA1358 | Q912 | MSF7BM07L | D581 | MTZJ5.1B |
| Q491, Q492 | RN1241 or | Q525, Q526 | 2SC5196 or 2SC4466 | Q913 | 7BM6S | D911 | RBV402 |
| Q493 | DTA114ES or RN2202 | Q527, Q528 | 2SA1939 or 2SA1693 | Q931 | 2SA1015 | D912, D913 | MTZ12C |
| Q501–Q504 | 2SC1845 | Q529–Q530 | 2SC1845 | Q941 | MS1943B | D914–D916, D931, D932 | GP104003E or AM01Z |
| Q505–Q508 | 2SC1740S or 2SC3458 | Q571 | 2SA9935 or 2SA1048 | | | D933 | MTZJZ7D |
| Q509–Q514 | 2SA949 | Q572 | 2SC1740S or 2SC3458 | | | D934 | MTZJ5.2C |
| Q515, Q516 | 2SC1740S or 2SC3458 | Q581, Q582 | 2SC1740S or 2SC3458 | | | D941 | MTZJ5.1B |
| Q517, Q518 | 2SC2229 | Q583 | 2SA992 | | | | |
| Q519, Q520 | 2SC1740S or 2SC3458 | Q591 | DTC123JS or RN1205 | | | | |

**NOTE**

- THE COMPONENTS IDENTIFIED BY MARK ⚠ ARE CRITICAL FOR SAFETY. REPLACE ONLY WITH PART NUMBER SPECIFIED.
- VOLTAGE (MEASURED WITH VOLTMETER) ⊐| IS DC VOLTAGE. (NO INPUT SIGNAL)
- ALL PNP TRANSISTORS ARE EQUIVALENT TO 2SA1015-GR UNLESS OTHERWISE NOTED.
- ALL NPN TRANSISTORS ARE EQUIVALENT TO 2SC1815-GR UNLESS OTHERWISE NOTED.
- ALL DIODES ARE EQUIVALENT TO 1SS133 UNLESS OTHERWISE NOTED.
- ELECTROLYTIC CAPACITORS (-Φ-) ARE IN μF/WV.
- ALL CAPACITORS ARE IN pF/50WV UNLESS OTHERWISE NOTED. EX) C330=3pF, C331=33pF, C321=330pF, C323=0.033μF
- ALL RESISTORS ARE IN OHMS 1/4 WATTS UNLESS OTHERWISE NOTED.
- THE THICK LINES IN PC BOARD ARE THE PRINTING SIDE OF THE PARTS. EX) [PRINTING SIDE]
- CIRCUIT IS SUBJECT TO CHANGE FOR IMPROVEMENT.

# SCHEMATIC DIAGRAM

## –Tuner/Microprocessor section–

NAAR-5513-1, -1A

NADIS-5517-1

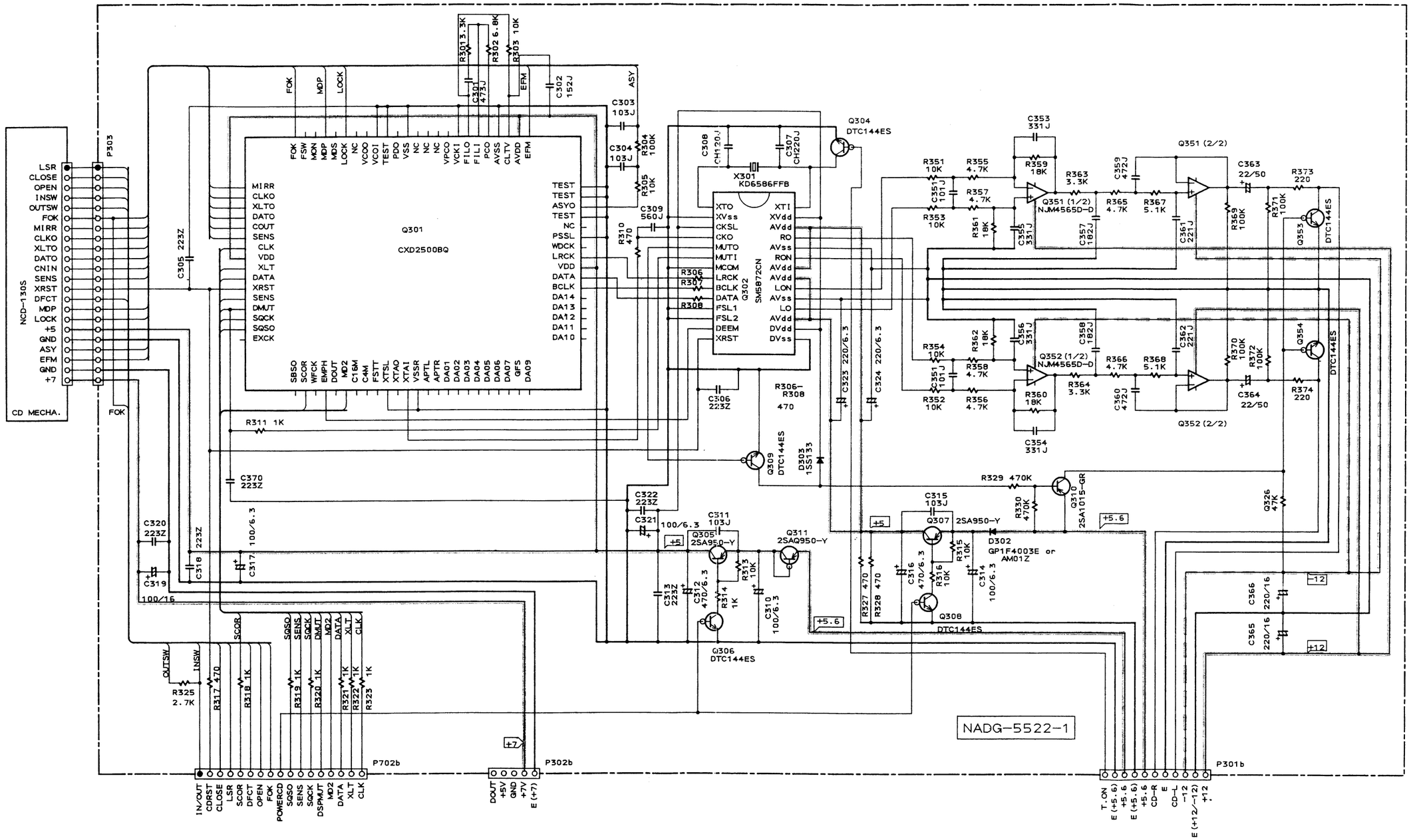
NASW-5518-1, 1B

NASW-5519-1

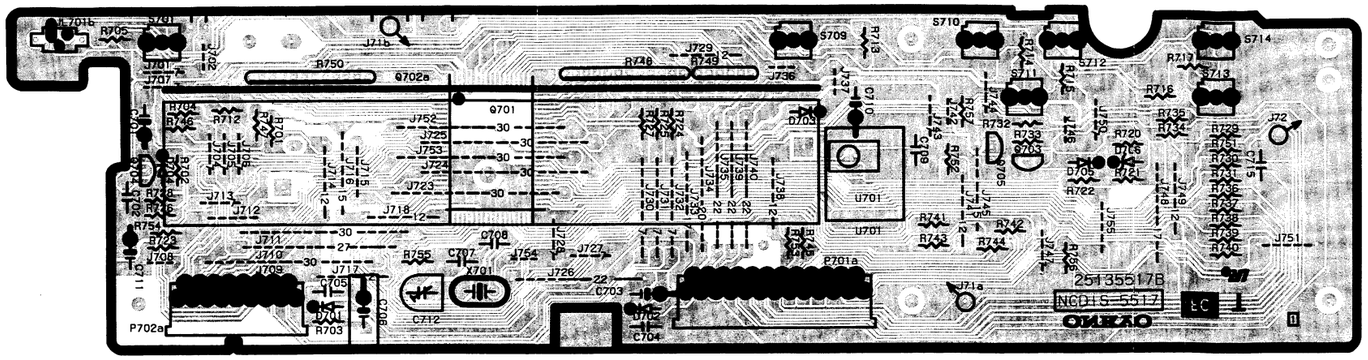
AF SECTION

# SCHEMATIC DIAGRAM

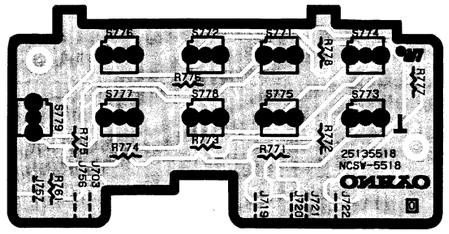
—CD section—



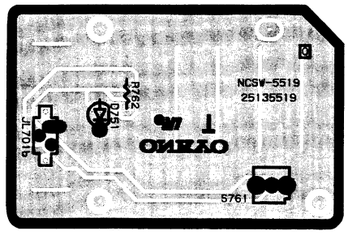
## PC BOARD VIEW FROM BOTTOM SIDE



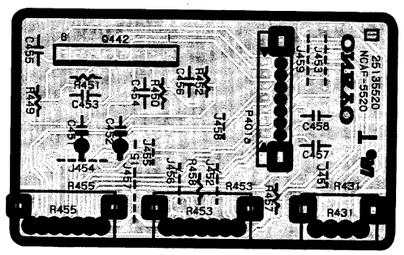
DISPLAY CIRCUIT PC BOARD



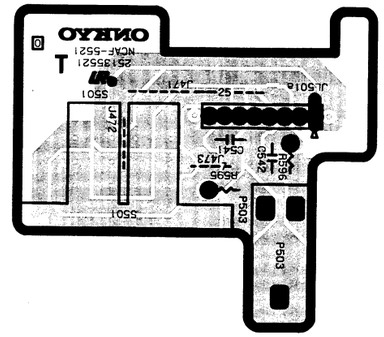
OPERATION SWITCH PC BOARD



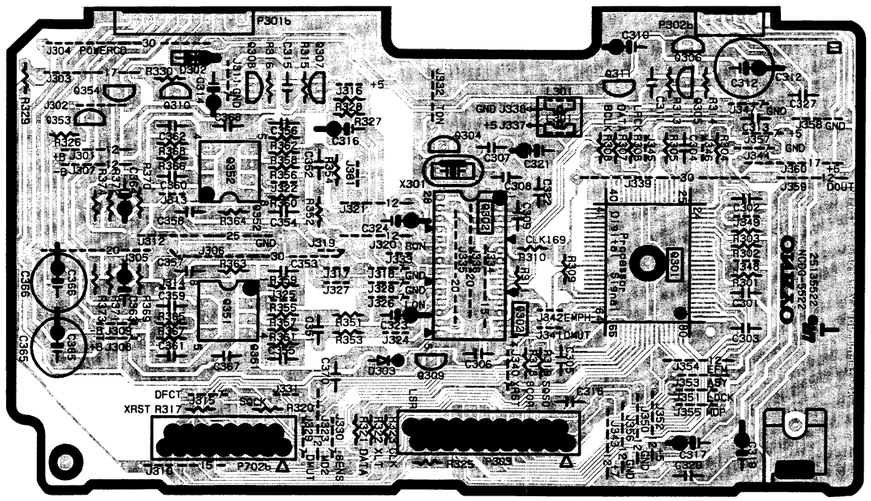
POWER SWITCH PC BOARD



TONE CIRCUIT PC BOARD

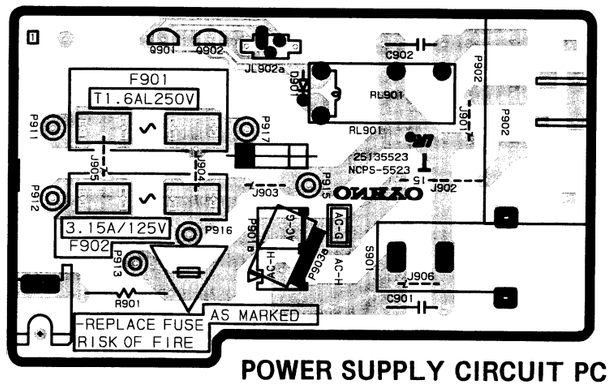


HEADPHONE TERMINAL PC BOARD

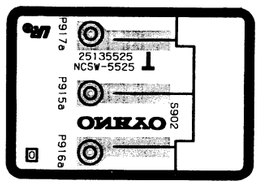


CD CIRCUIT PC BOARD

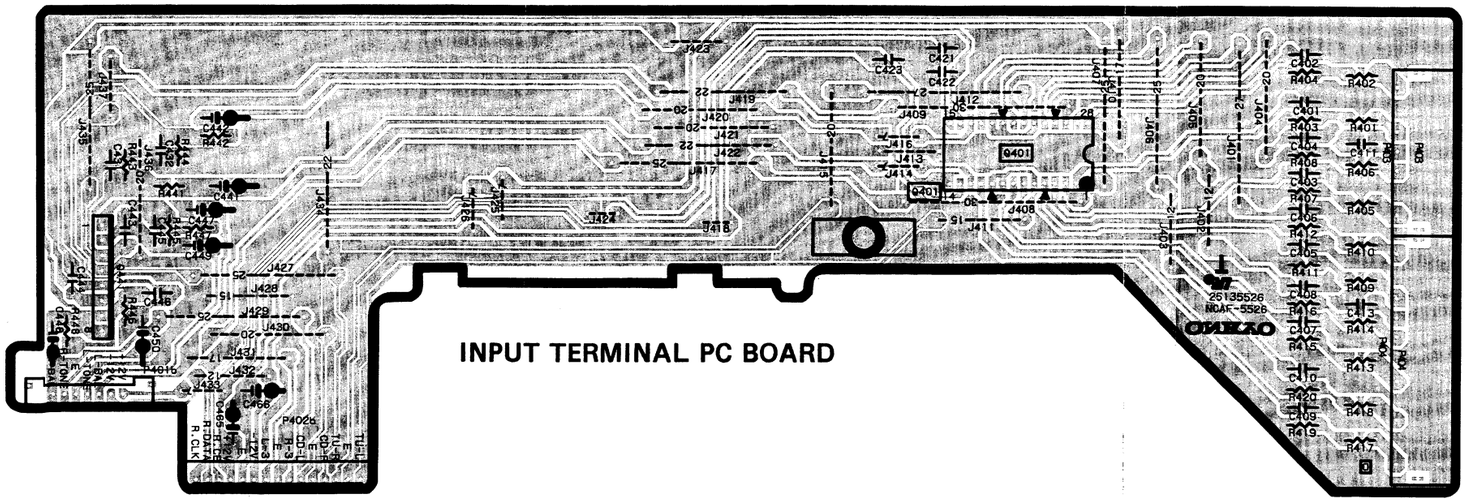
PRIMARY CIRCUIT PC BOARD



POWER SUPPLY CIRCUIT PC BOARD



VOLTAGE SELECTOR SWITCH PC BOARD



INPUT TERMINAL PC BOARD

# PRINTED CIRCUIT BOARD – PARTS LIST

MAIN CIRCUIT PC BOARD (NAAR-5513-1/1A)

| CURCUIT NO. | PART NO. | DESCRIPTION |
|---|---|---|
| | **Front end** | |
| U001 | 240089 | FE415-G11 |
| | **ICs** | |
| Q103 | 22240890 | LA1836 |
| Q171 | 22240090 | LM7001 |
| Q185 | 22240679 | μPC1346CS |
| Q481 | 22240239 | TA7291S |
| Q911 | 222780125NEC | 78M12HF |
| Q912 | 222780075MIT | M5F78M07L |
| Q913 | 222780565JRC | 78M56 |
| Q941 | 222951 | M51943B |
| | **Transistors** | |
| Q101 | 2210746 | 2SC945A-P |
| Q102 | 2211723 | 2SC1923-O |
| Q104,Q173 | 2212115 or | 2SC2458-GR or |
| | 2213284 | 2SC1740S-R |
| Q172 | 2212445 | 2SK365-GR |
| Q174 | 2213510 | DTA114ES |
| Q201,Q202 | 2212794 | 2SD1468-R |
| Q203 | 2213510 | DTA114ES |
| Q482 | 2212115 or | 2SC2458-GR or |
| | 2213284 | 2SC1740S-R |
| Q491,Q492 | 2213631 or | RN1241-A or |
| | 2213632 | RN1241-B |
| Q493 | 2213510 or | DTA114ES or |
| | 2214350 | RN2202 |
| Q501~Q504 | 2211732 or | 2SC1845-F or |
| | 2211733 | 2SC1845-E |
| Q505~Q508 | 2212115 or | 2SC2458-GR or |
| Q515,Q516 | 2213284 | 2SC1740S-R |
| Q509~Q514 | 2211353 or | 2SA949-O or |
| | 2211354 | 2SA949-Y |
| Q517,Q518 | 2211633 or | 2SC2229-O or |
| | 2211634 | 2SC2229-Y |
| Q519,Q520 | 2212115 or | 2SC2458-GR or |
| | 2213284 | 2SC1740S-R |
| Q521,Q522 | 2212653 or | 2SC3421-O or |
| | 2212654 | 2SC3421-Y |
| Q523,Q524 | 2212643 or | 2SA1358-O or |
| | 2212644 | 2SA1358-Y |
| Q525,Q526 | 2202923, | * 2SC5196-O, |
| | 2202922, | * 2SC5196-R, |
| | 2202373, | * 2SC4466-O, |
| | 2202374 or | * 2SC4466-Y or |
| | 2202375 | * 2SC4466-P |
| Q527,Q528 | 2202913, | * 2SA1939-O, |
| | 2202912, | * 2SA1933-R, |
| | 2202363, | * 2SA1693-O, |
| | 2202364 or | * 2SA1693-Y or |
| | 2202365 | * 2SA1693-P |

| CURCUIT NO. | PART NO. | DESCRIPTION |
|---|---|---|
| | **Transistors** | |
| Q529,Q530 | 2211732 or | 2SC1845-F or |
| | 2211733 | 2SC1845-E |
| Q571 | 2212125 or | 2SA1048-GR or |
| | 2213354 | 2SA933S-R |
| Q572 | 2212115 or | 2SC2458-GR or |
| Q581,Q582 | 2213284 | 2SC1740S-R |
| Q583 | 2211793 or | 2SA992-E or |
| | 2211792 | 2SA992-F |
| Q591 | 2213640 or | DTC123JS or |
| | 2214660 | RN1205 |
| Q931 | 2211455 | 2SA1015-GR |
| | **Diodes** | |
| D101 | 224470753 | MTZJ7.5C |
| D102 | 223205 or | 1SS270A or |
| D171,D172 | 223163 | 1SS133 |
| D174 | 224470823 | MTZJ8.2C |
| D185 | 223205 or | 1SS270A or |
| D571~D573 | 223163 | 1SS133 |
| D581,D941 | 224470512 | MTZJ5.1B |
| D591 | 223205 or | 1SS270A or |
| | 223163 | 1SS133 |
| D911 | 22380022F or | RBV402 or |
| | 22380271F | D3SBA20 |
| D912,D913 | 224471203 | MTZJ12C |
| D914~D916 | 22380035 or | GP104003E or |
| D931,D932 | 22380046 | AM01Z |
| D933 | 224472704 | MTZJ27D |
| D934 | 224470623 | MTZJ6.2C |
| | **Ceramic filters** | |
| X101,X102 | 3010071 | SFE10.7MA5 |
| X103 | 3010130 | SFE10.7MZ2A |
| | **Resonators** | |
| X171 | 3010141 | XTL-7.2M,Crystal |
| X185 | 3010203 | AF6146CG,Crystal |
| X201 | 3010227 | CSB456F15,Ceramic |
| | **Transformers** | |
| L101 | 233457 | NFIF-4081 |
| L102 | 233458 | NFIF-4082 |
| | **Coils** | |
| L103 | 233454K220 | NCH-1452 |
| L104 | 233383 | NMC-6070 |
| L201,L202 | 233355A | NMC-4059 |
| L501,L502 | 231176S | S-1.3C |
| | **Capacitors** | |
| C001,C105 | 393341017 | 100μF,16V,Elect. |
| C106,C108 | 393341007 | 10μF,16V,Elect. |
| C110,C151 | 354780229 | 2.2μF,50V,Elect. |
| C111 | 374721224 | 1200pF±5%,50V,Plastic |
| C153 | 354744709 | 47μF,16V,Elect. |
| C154 | 354780109 | 1μF,50V,Elect. |

| CURCUIT NO. | PART NO. | DESCRIPTION |
|---|---|---|
| | **Capacitors** | |
| C176,C195 | 354721019 | 100μF,6.3V,Elect. |
| C178 | 393341017 | 100μF,16V,Elect. |
| C179 | 374723334 | 0.033μF±5%,50V,Plastic |
| C180,C190 | 354780229 | 2.2μF,50V,Elect. |
| C181,C188 | 374722234 | 0.022μF±5%,50V,Plastic |
| C182 | 354782299 | 0.22μF,50V,Elect. |
| C187,C193 | 374724724 | 4700pF±5%,50V,Plastic |
| C189 | 374724734 | 0.047μF±5%,50V,Plastic |
| C191,C192 | 374723324 | 3300pF±5%,50V,Plastic |
| C201,C202 | 354780109 | 1μF,50V,Elect. |
| C203 | 354784799 | 0.47μF,50V,Elect. |
| C204 | 354780229 | 2.2μF,50V,Elect. |
| C207~C210 | 393341007 | 10μF,16V,Elect. |
| C213,C214 | 393341007 | 10μF,16V,Elect. |
| C215,C216 | 374721824 | 1800pF±5%,50V,Plastic <P> |
| | 374722224 | 2200pF±5%,50V,Plastic <W> |
| C492 | 354721019 | 100μF,6.3V,Elect. |
| C493,C494 | 354780479 | 4.7μF,50V,Elect. |
| C501,C502 | 393341007 | 10μF,16V,Elect. |
| C511,C512 | 393322217 | 220μF,6.3V,Elect. |
| C521~C524 | 393381007 | 10μF,50V,Elect. |
| C525,C526 | 374724734 | 0.047μF±5%,50V,Plastic |
| C567,C568 | 393300107 | 1μF,160V,Elect. |
| C569,C570 | 393381017 | 100μF,50V,Elect. |
| C571 | 393341007 | 10μF,16V,Elect. |
| C572 | 393341017 | 100μF,16V,Elect. |
| C573,C574 | 393322217 | 220μF,6.3V,Elect. |
| C575 | 355742209 | 22μF,16V,Elect. |
| C581 | 354721019 | 100μF,6.3V,Elect. |
| C591 | 374721034 | 0.01μF±5%,50V,Plastic |
| C592 | 354742209 | 22μF,16V,Elect. |
| C911,C912 | 3504207 | 6800μF,50V,Elect. |
| C913,C914 | 393343317 | 330μF,16V,Elect. |
| C916,C918 | 393341007 | 10μF,16V,Elect. |
| C921 | 354764709 | 47μF,35V,Elect. |
| C922 | 354753329 | 3300μF,25V,Elect. |
| C924 | 393341007 | 10μF,16V,Elect. |
| C931 | 354761019 | 100μF,35V,Elect. |
| C932 | 393381017 | 100μF,50V,Elect. |
| C935 | 393381007 | 10μF,50V,Elect. |
| C941 | 354780109 | 1μF,50V,Elect. |
| C956,C957 | 374721044 | 0.1μF±5%,50V,Plastic |
| | **Resistors** | |
| R101 | 5210261 | N06HR5KBC,Trim |
| R185 | 5210263 | N06HR20KBC,Trim |
| R519~R522 | 443526804 | 68Ω ±5%,1/2W,Metal oxide |
| R523,R524 | 443525604 | 56Ω ±5%,1/2W,Metal oxide |
| R525,R526 | 443526804 | 68Ω ±5%,1/2W,Metal oxide |
| R531 | 5210259 | N06HR2KBC,Trim |
| R537,R538 | 443528204 | 82Ω ±5%,1/2W,Metal oxide |

| CIRCUIT NO. | PART NO. | DESCRIPTION |
|---|---|---|
| | **Resistors** | |
| R539,R540 | 4500027 | MPC708-2WK0.22,Metal plate |
| R545,R546 | 453630824 | 8.2Ω ±5%,1W,Metal |
| R569,R570 | 443522204 | 22Ω ±5%,1/2W,Metal oxide |
| R591 | 443628214 | 820Ω ±5%,1W,Metal oxide |
| R911~R914 | 443623314 | 330Ω ±5%,1W,Metal oxide |
| R915,R916 | 453530224 | 2.2Ω ±5%,1/2W,Metal |
| R917,R918 | 453534794 | 0.47Ω ±5%,1/2W,Metal |
| R919 | 453630394 | 3.9Ω ±5%,1W,Metal |
| R920 | 453630564 | 5.6Ω ±5%,1W,Metal |
| R931 | 443525604 | 56Ω ±5%,1/2W,Metal oxide |
| R933 | 443522204 | 22Ω ±5%,1/2W,Metal oxide |
| R937 | 453530474 | 4.7Ω ±5%,1/2W,Metal |
| R941 | 443521824 | 1.8kΩ ±5%,1/2W,Metal oxide |
| | **Relay** | |
| RL591 | 25065485 | NRL-2P2A |
| | **Terminals** | |
| P505 | 25045330 | NPJ-2PDBL184 |
| P001 | 25060231 | NTM-1PD153 |
| P002 | 25060117 | NTM-2PDML051 |
| P501 | 25060125 | NTM-8PDMN058 |
| | **Socket** | |
| P701b | 25051503, | NSCT-25P1290, |
| | 25050965 or | NSCT-25P752 or |
| | 25050857 | NSCT-25P652 |
| | **Wire traps** | |
| JL501b | 25050272 | NSCT-8P100 |
| JL901b | 25050273 | NSCT-9P101 |
| | **Plugs** | |
| P101,P185 | 25055038 | NPLG-2P29 |
| P301a | 25055707 | NPLG-11P663 |
| P302a | 25055701 | NPLG-5P657 |
| P402a | 25055711 | NPLG-15P667 |
| P481a | 25055708 | NPLG-12P664 |
| P521,P522 | 25055038 | NPLG-2P29 |
| | **Radiators** | |
| Q912a | 27160211Y | RAD-68 |
| Q913a | 27160211-1Y | RAD-68B |

**VOLUME PC BOARD(NAETC-5514-1)**

| CIRCUIT NO. | PART NO. | DESCRIPTION |
|---|---|---|
| | **Capacitors** | |
| C481,C482 | 374724734 | 0.047μF±5%,50V,Plastic |
| C483,C484 | 374728214 | 820pF±5%,50V,Plastic |
| | **Resistor** | |
| R481,R482 | 5104364 | N16RQL100KBT20F,Variable |
| | **Socket** | |
| P481b | 25051237 | NSCT-12P1027 |
| | **Push switch** | |
| S481 | 25035609 | NPS-122-L571 |

**SECONDARY CIRCUIT PC BOARD (NAETC-5515-1)**

| CIRCUIT NO. | PART NO. | DESCRIPTION |
|---|---|---|
| JL901a | 25051113 | NSCT-9P900,Wire holder |

**DISPLAY CIRCUIT PC BOARD(NADIS-5517-1)**

| CIRCUIT NO. | PART NO. | DESCRIPTION |
|---|---|---|
| | **IC** | |
| Q701 | 22240917 | MPD78044AGF-142 |
| | **Fl tube** | |
| Q702 | 212141 | 10-BT-167GK |
| | **Transitors** | |
| Q703 | 2212600 | DTA124ES |
| Q704 | 221282 | DTC144ES |
| Q705 | 2213750 | DTA144ES |
| | **Remote sensor** | |
| U701 | 24130010 | HC312 |
| | **Diodes** | |
| D701~D705 | 223205 or | 1SS270A or |
| | 223163 | 1SS133 |
| D706 | 224470562 | MTZJ5.6B |
| | **Resonator** | |
| X701 | 3010224 | XTAL-4.19MHz,Crystal |
| | **Capacitors** | |
| C701,C711 | 353780229 | 2.2 $\mu$ F,50V,Elect. |
| C703,C710 | 353721019 | 100 $\mu$ F,6.3V,Elect. |
| C706 | 3000076 | 0.1F,5.5V,Super |
| | **Holder** | |
| Q702a | 27190754B | FL |
| | **Sockets** | |
| P701a | 25051523, | NSCT-25P1310, |
| | 25050931 or | NSCT-25P718 or |
| | 25050889 | NSCT-25P684 |
| P702a | 25051515, | NSCT-17P1302, |
| | 25050923 or | NSCT-17P710 or |
| | 25050881 | NSCT-17P676 |
| | **Wire holder** | |
| JL701a | 25051087 | NSCT-3P874 |
| | **Push switches** | |
| S701 | 25035652 | NPS-111-S604 |
| S709~S714 | 25035652 | NPS-111-S604 |

**OPERATION SWITCH PC BOARD(NASW-5518-1/1A)**

| CIRCUIT NO. | PART NO. | DESCRIPTION |
|---|---|---|
| S771~S776 | 25035652 | NPS-111-S604,Push switches |
| S777 | 25035652 | NPS-111-S604,Push switch <P> |
| S778 | 25035652 | NPS-111-S604,Push switch |

**POWER SWITCH PC BOARD (NASW-5519-1/1A)**

| CIRCUIT NO. | PART NO. | DESCRIPTION |
|---|---|---|
| | L.E.D | |
| D751 | 225291D | SEL4910D-D |
| | **Switch** | |
| S761 | 25035652 | ⚠ NPS-111-S604 |
| | **Wire holder** | |
| JL701b | 25051087 | NSCT-3P874 |

**TONE CIRUCIT PC BOARD (NAAF-5520-1)**

| CIRCUIT NO. | PART NO. | DESCRIPTION |
|---|---|---|
| | **IC** | |
| Q442 | 22240293 | NJM4558L-D |
| | **Capacitors** | |
| C457,C458 | 374721534T | 0.015 $\mu$ F±5%,50V, Plastic |
| C451,C452 | 393341007T | 10 $\mu$ F,16V, Elect. |
| C453,C454 | 374721534T | 0.015 $\mu$ F±5%,50V, Plastic |
| | **Resistors** | |
| R431,R432 | 5104361 | N11RGLC250KWT15Z,Variable |
| R453~R456 | 5104360 | N14RGLC100KWT15Z,Variable |
| | **Socket** | |
| P401a | 25051535 | NSCT-7P1322 |

**HEADPHONE TERMINAL PC BOARD(NAAF-5521-1)**

| CIRCUIT NO. | PART NO. | DESCRIPTION |
|---|---|---|
| | **Resistors** | |
| R595,R596 | 443523914 | 390 Ω ±5%,Metal oxide |
| | **Push switch** | |
| S501 | 25035517 | NPS-222-L479 |
| | **Headphone jack** | |
| P503 | 25045255 | YKB21-5009 |
| | **Wire holder** | |
| JL501a | 25051112 | NSCT-8P899 |

**CD CIRCUIT PC BOARD (NADG-5522-1/1A)**

| CIRCUIT NO. | PART NO. | DESCRIPTION |
|---|---|---|
| | **ICs** | |
| Q301 | 22240487A | CXD2500BQ |
| Q302 | 22240726 | SM5872CN |
| Q351,Q352 | 22240191 | NJM4565D-D |
| | **Transistors** | |
| Q310 | 2211455 | 2SA1015-GR |
| Q305,Q307 | 2211504 | 2SA950-Y |
| Q311 | 2211504 | 2SA950-Y |
| Q304,Q306 | 221282 | DTC144ES |
| Q308,Q309 | 221282 | DTC144ES |
| Q353,Q354 | 221282 | DTC144ES |
| | **Diodes** | |
| D302 | 22380035 or | GP104003E or |
| D302or | 22380046 | AM01Z |
| D303 | 223205 or | 1SS270A or |
| D303or | 223163 | 1SS133 |

| CIRCUIT NO. | PART NO. | DESCRIPTION |
|---|---|---|
| | **Resonator** | |
| X301 | 3010112 | KD6586FFB,Crystal |
| | **Capacitors** | |
| C301 | 374724734 | 0.047 μ F±5%,50V, Plastic |
| C302 | 374721524 | 1500pF±5%,50V, Plastic |
| C303,C304 | 374721034 | 0.01 μ F±5%,50V, Plastic |
| C310,C314 | 393321017 | 100 μ F,6.3V, Elect. |
| C311,C315 | 374721034 | 0.01 μ F±5%,50V, Plastic |
| C312,C316 | 393324717 | 470 μ F,6.3V, Elect. |
| C317,C321 | 393321017 | 100 μ F,6.3V, Elect. |
| C319 | 393341017 | 100 μ F,16V, Elect. |
| C323,C324 | 393322217 | 220 μ F,6.3V, Elect. |
| C357,C358 | 374721824 | 1800pF±5%,50V, Plastic |
| C359,C360 | 374724724 | 4700pF±5%,50V, Plastic |
| C363,C364 | 393382207 | 22 μ F,50V, Elect. |
| C365,C366 | 393342217 | 220 μ F,16V, Elect. |
| | **Sockets** | |
| P303 | 25051500, 25050962 or 25050854 | NSCT-22P1287, NSCT-22P749 or NSCT-22P649 |
| P702 | 25051495, 25050957 or 25050849 | NSCT-17P1282, NSCT-17P744 or NSCT-17P644 |
| P301b | 25051236 | NSCT-11P1026 |
| P302b | 25051230 | NSCT-5P1020 |

**POWER SUPPLY CIRCUIT PC BOARD(NAPS-5523-1/1A)**

| CIRCUIT NO. | PART NO. | DESCRIPTION |
|---|---|---|
| C901 | 3500191 | ⚠ DE7150F103M,Capcitor IS |
| S901 | 25035550 | ⚠ NPS-111-L512,Push switch |
| P901a | 25055713 | NPLG-2P669,Plug |
| F901a | 25050065 | ⚠ YSH403T,Fuseholder |
| F902a | 25050065 | ⚠ YSH403T,Fuseholder |
| F901 | 252073 | ⚠ 1.6A-SE-EAK,Fuse |
| F902 | 252150 | ⚠ 3.15A-TSC,Fuse <W> |

**VOLTAGE SELECTOR SWITCH PC BOARD (NASW-5525-1)**

| CIRCUIT NO. | PART NO. | DESCRIPTION |
|---|---|---|
| S902 | 25065437 | ⚠ NSS-22157P,Slide switch |

**INPUT TERMINAL PC BOARD (NAAF-5526-1)**

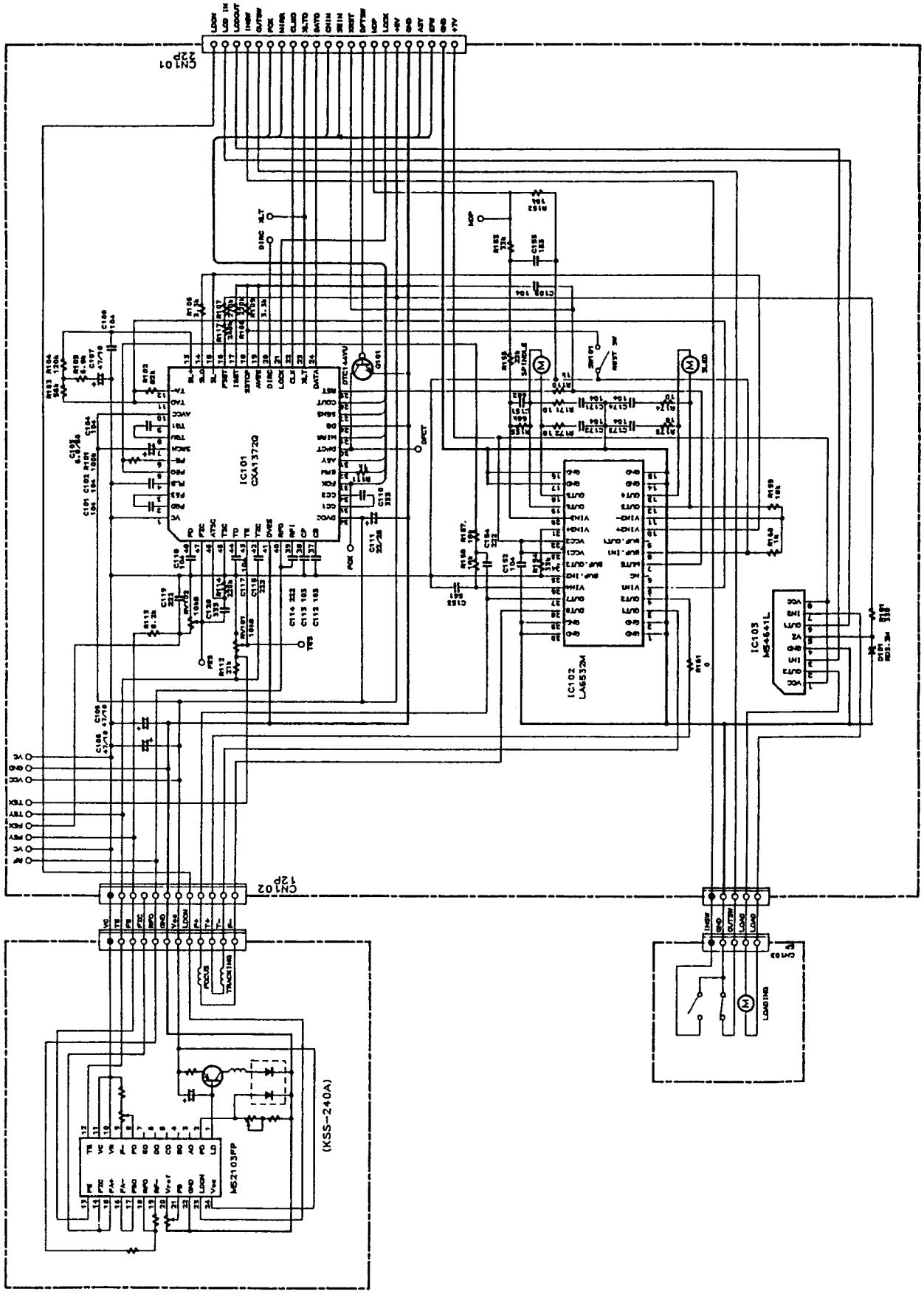
| CIRCUIT NO. | PART NO. | DESCRIPTION |
|---|---|---|
| | **ICs** | |
| Q401 | 22240800 | TC9164AN |
| Q441,Q442 | 22240293 | NJM4558L-D |
| | **Capacitors** | |
| C447,C448 | 393344707 | 47 μ F,16V, Elect. |
| C449~C452 | 393341007 | 10 μ F,16V, Elect. |
| C465,C466 | 393341007 | 10 μ F,16V, Elect. |
| | **Plug** | |
| P401b | 25055813 | NPLG-7P769 |
| | **Socket** | |
| P402b | 25051240 | NSCT-15P1030 |
| | **Terminals** | |
| P403 | 25045303 | NPJ-4PDBL162 |
| P404 | 25045300 | NPJ-6PDBL159 |

**NOTE: THE COMPONENTS IDENTIFIED BY MARK ⚠ ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PART NUMBER SPECIFIED.**

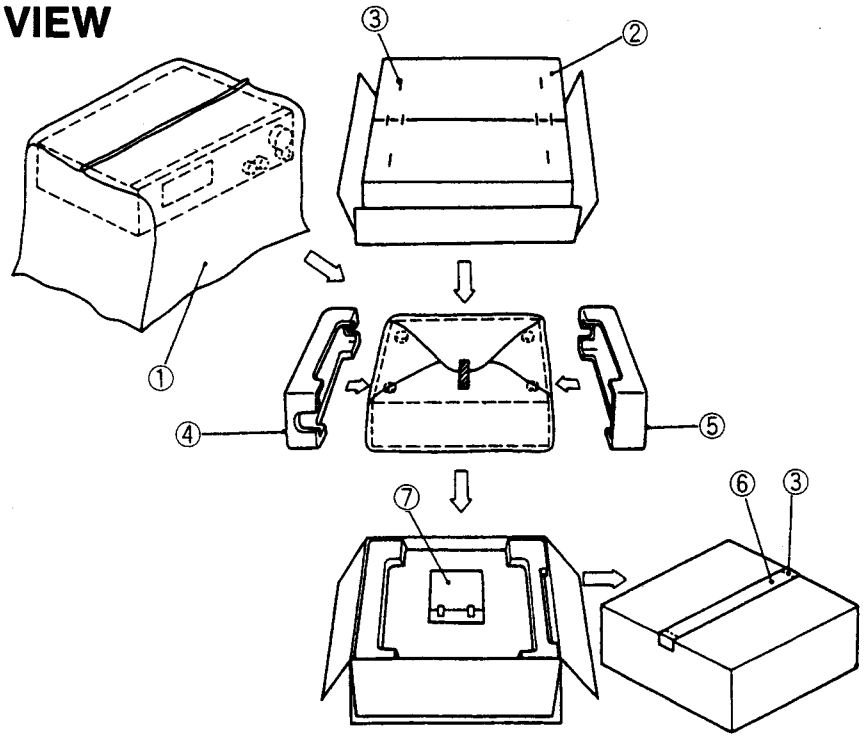
**CAUTION: Replacement of the transistor of mark *, if necessary, must be made from the same beta group (Hrr) as the original type.**

# SCHEMATIC DIAGRAM

—CD section—



# PACKING VIEW




| REF.NO. | PART NO. | DESCRIPTION |
|---|---|---|
| 1 | 29100105 | 680×550,Styren bag |
| 2 | 29052907 | Carton box <B> |
| | 29052906 | Carton box <S> |
| 3 | 282301 | Staple |
| 4 | 29091700 | Pad F |
| 5 | 29091701 | Pad B |
| 6 | 29110071 | PP tape |
| | 29100097-1Y | 350×250,Styren bag |
| | 2010200 | Cord RI |
| | 25055040 | CV-K-2,Conversion plug <W> |
| | 292112Y | FM antenna |
| | 29342178 | Instruction manual, English |
| | 29342179 | Instruction manual U6 <P> |
| | 29342180 | Instruction manual U3 |
| | 29342182 | Instruction manual U3 <W> |
| | 29355133A | Instruction sheet |
| | 29361731A | Label |
| | 29361574 | Label |
| | 29360687 | Label, Class 1 |
| | 24140302 | RC-302S, Remote control transmitter |
| | 29095746 | Sheet |
| | 29095745A | Sheet U7 <P> |
| | 3010054 | UM-3, Battery |
| | 25065462 | YA21-0237, FM adaptor <W> |

NOTE: <P>:230V model only
<W>:Worldwide model only
<S>:Silver model only
<B>:Black model only

**ONKYO CORPORATION**

International Sales Dept. : 31 Sankyo-bild. 3-8-5, Asakusabashi, Taito-ku, TOKYO 111, JAPAN
TEL : 03-5820-5865 FAX : 03-5820-5869
**ONKYO U.S.A. CORPORATION**
200 Williams Drive, Ramsey, N.J. 07446, U.S.A.
Tel: 201-825-7950 Fax: 201-825-8150
**ONKYO DEUTSCHLAND GMBH ELECTRONICS**
Industriestrasse 18-20, 82110 Germering, GERMANY
Tel: 089 84 93 20 Fax: 089 84 93 226
**ONKYO FRANCE**
Immeuble Le Diamant, Domaine Technologique de Saclay, 4 Rue René Razel,
91892 SACLAY, FRANCE Tel: (1) 69 33 14 00 Fax: (1) 69 41 35 84



Part No. 0M3521 NS509

Printed by: Schaltungsdienst Lange Berlin (Germany)